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DRAFT HEALTH AND SAFETY PLAN FOR REMEDIAL INVESTIGATION AT OFFSITE
WEAPONS STORAGE AREA NAS FORT WORTH TX
12/1/1996
THE ENVIRONMENTAL COMPANY

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**NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS**

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 316

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DRAFT HEALTH AND SAFETY PLAN

**RCRA FACILITY INVESTIGATION (RFI) OF THE
OFFSITE WEAPONS STORAGE AREA (WSA)**

AT

**NAVAL AIR STATION (NAS) FORT WORTH
JOINT RESERVE BASE (JRB)
CARSWELL FIELD, TEXAS**



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JOINT RESERVE BASE (JRB)
CARSWELL FIELD, TEXAS**

Contract No. F41624-95-D-8002
Delivery Order 0009

December 1996

Prepared for:

Air Force Materiel Command (AFMC)
Headquarters (HQ) Human Systems Center (HSC) PKVCC
3207 North Road
Brooks AFB, Texas 78235-5363

Prepared by:

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DIRECTIONS TO NEAREST HOSPITAL

The station hospital cannot be used by site personnel.

The Harris Methodist Fort Worth Hospital is the initial primary care facility in case of an accident. The hospital is located at 1300 Pennsylvania Avenue, Fort Worth, Texas.

Hospital: (817) 882-2000

Emergency: 9 1 1

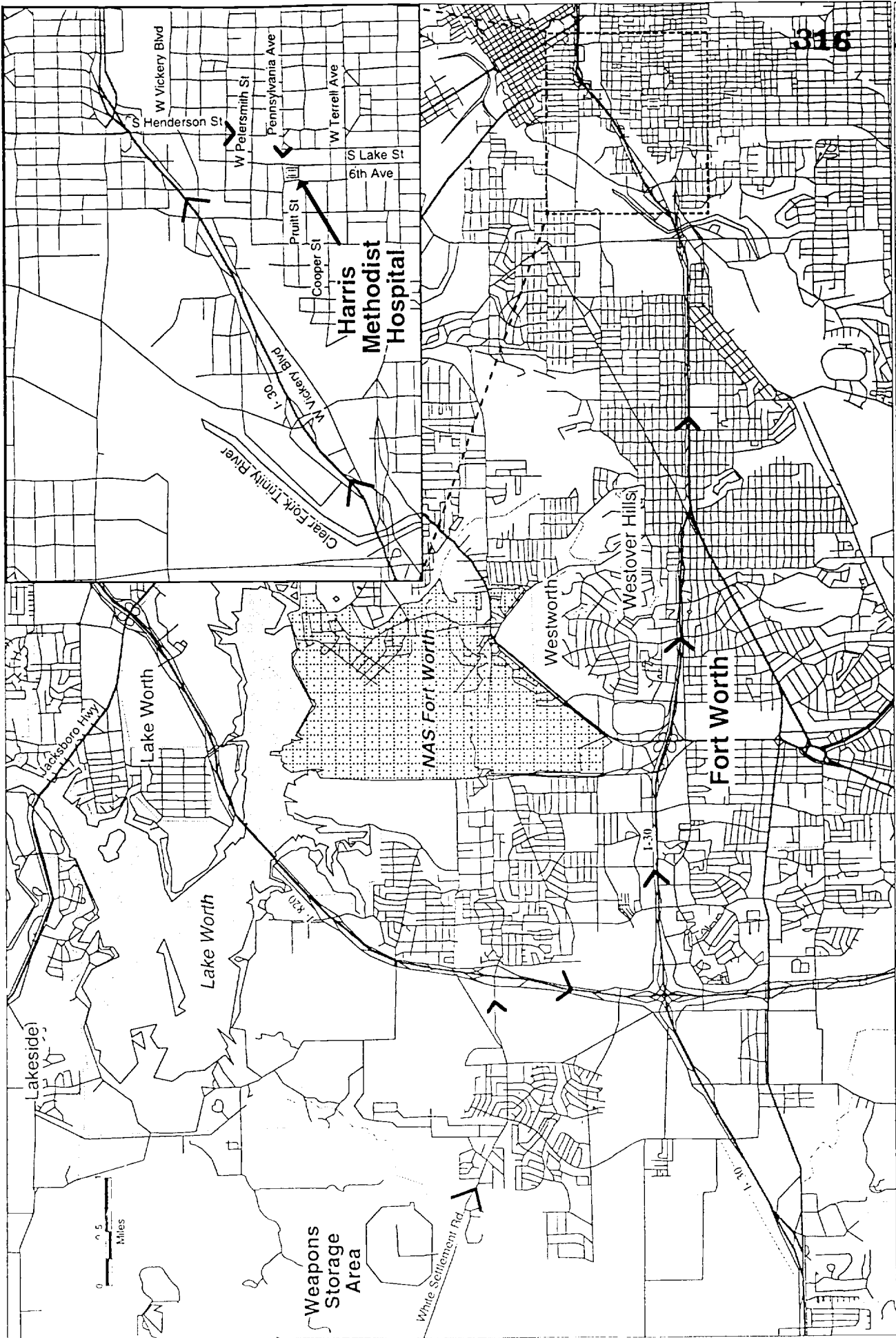
Route to Hospital: Refer to the figure on the next page.

Distance: The hospital is approximately 18 miles east of the Naval Air Station (NAS) Fort Worth Weapons Storage Area (WSA).

Directions: From the main gate of the WSA turn right onto White Settlement Road. Turn right onto I-820 heading south and then left onto I-30 east. Exit at Henderson Street. Proceed south on Henderson Street to Pennsylvania Avenue. The hospital is on the corner of 6th Avenue and Pennsylvania Avenue.

EMERGENCY INFORMATION

Contact	Name	Phone
CHSM	Alistair J. Downie	(804) 295-4446
PHSM	To be determined	(804) 295-4446
SHSM	To be determined	(804) 295-4446
Project Manager	Bob Duffner, P.E.	(206) 391-2785
Organization		Phone
Non-Military Ambulance, Fire, and Police Emergency		9 1 1
NAS Fort Worth Fire Department		(817) 782-6330
Texas Water Commission, Industrial & Hazardous Waste Division		(512) 463-7761
State Police		(817) 335-4222
North Texas Poison Control Center		(800) 441-0040
USEPA Environmental Response Team		(201) 321-6660
CHEMTREC		(800) 424-9300
U. S. Coast Guard Environmental Response Team		(800) 424-8802



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Harris Methodist Hospital Locator Map

Date: November 1996
 Project Manager: B. Dufiner
 Prepared By: WSM
 Project No: P-3109

The
 Environmental
 Company, Inc.

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LIST OF ACRONYMS AND ABBREVIATIONS

μR/hr	micro Roentgen per hour
ACC	Air Combat Command
ACM	Asbestos Containing Material
AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CCL	Contamination Control Line
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CHSM	Corporate Health and Safety Manager
COR	Contracting Officer's Representative
cpm	counts per minute
CPR	Cardiopulmonary Resuscitation
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
CZ	Clean Zone
DBCRA	Defense Base Closure and Realignment Act
DoD	Department of Defense
DOT	Department of Transportation
EDB	Ethylene dibromide
EOD	Explosive Ordnance Disposal
EZ	Exclusion Zone
FID	Flame Ionization Detector

FS	Feasibility Study
FSA	Fuel Storage Annex
FSP	Field Sampling Plan
HEPA	High Efficiency Particulate Air-Filter
HMIS	Hazardous Material Information System
HQ	Headquarters
HSP	Health and Safety Plan
IDLH	Immediately Dangerous to Life and Health
IRA	Interim Remedial Action
IRP	Installation Restoration Program
JRB	Joint Reserve Base
LEL	Lower Explosive Limit
mR/hr	mill Roentgen per hour
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NAS	Naval Air Station
NIOSH	National Institute for Occupational Safety and Health
OJT	On-The-Job Training
OSHA	Occupational Safety and Health Administration
OSM	Office Safety Manager
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated biphenyl
PEL	Permissible Exposure Limit
PHSM	Project Health and Safety Manager
PID	Photoionization Detector
PM	Project Manager

POC	Point of Contact
PPE	Personal Protective Equipment
ppm	parts per million
QPP	Quality Program Plans
RCRA	Resource Conservation and Recovery Act
REZ	Radiation Exclusion Zone
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROPS	Roll-Over Protective Structure
SAC	Strategic Air Command
SARA	Superfund Amendments Reauthorization Act
SCBA	Self-Contained Breathing Apparatus
SHSM	Site Health and Safety Manager
SOP	Standard Operating Procedures
SOW	Statement Of Work
STEL	Short-Term Exposure Limit
SWMU	Solid Waste Management Unit
SZ	Support Zone
TCE	Trichloroethylene
TEC	The Environmental Company, Inc.
TEPH	Total Extractable Petroleum Hydrocarbons
TLV	Threshold Limit Value
TPH	Total Petroleum Hydrocarbons
TWA	Time-Weighted Average
UEL	Upper Explosive Limit
USACE	U.S. Army Corps of Engineers

USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
USNRC	U.S. Nuclear Regulatory Commission
UST	Underground Storage Tank
VOC	Volatile Organic Compound
VP	Vapor Pressure
WP	Work Plan
WSA	Weapons Storage Area

1.0 INTRODUCTION

This Health and Safety Plan (HSP) has been prepared by The Environmental Company, Inc. (TEC) for the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of the Offsite Weapons Storage Area (WSA) at Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB) Carswell Field, Texas. This HSP is a project scoping document prepared under Contract No. F41624-95-D-8002, Delivery Order 0009.

This HSP has been written for use by employees of TEC and other individuals authorized to access areas where site control is established to conduct field work. Because of the nature of this site and the activity occurring there, it is not possible to discover, evaluate, or provide protection for all possible hazards that may be encountered. Known and suspected hazards are listed in Table 3-1, Section 3.1. Strict adherence to the health and safety guidelines stated in this HSP will reduce, but not eliminate, the potential for injury at the site. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety professionals.

This HSP will be kept on site during field activities and will be reviewed and updated as necessary to reflect current site conditions and operations. This HSP requires the TEC Corporate Health and Safety Manager (CHSM), Project Health and Safety Manager (PHSM), Site Health and Safety Manager (SHSM), and Project Manager (PM) to be familiar with the following:

- Applicable Federal, State, and local regulations;
- Standard operating procedures (SOPs) contained in TEC's Health and Safety Policy Manual for Hazardous Waste Projects (TEC, 1992);
- Requirements established in the *Air Force Center for Environmental Excellence (AFCEE) Handbook for the Installation Restoration Program (IRP) Remedial Investigation/Feasibility Study (RI/FS)* (USAF, 1993);
- Requirements set forth in the U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (USACE, 1992); and
- Procedures contained in the Work Plan and other Quality Program Plan (QPP) documents for this project.

In addition to this HSP, each subcontractor is expected to have prepared their own health and safety program covering their specific operational activities (e.g., soil boring, well installation/development). In instances where overlaps or conflicts occur between requirements in this HSP and a subcontractor's health and safety procedures, the requirement that is most protective of the employee's health and safety will take precedence and be determined during premobilization and daily tailgate safety meetings. Additional information regarding adherence of this HSP by subcontractors is provided in Section 2.3.

The overall intent of this HSP is to create a site health and safety program that effectively identifies, evaluates, controls, and reduces health and safety hazards. This HSP is written for the site conditions, purposes, dates, and personnel specified and must

be amended if these conditions change. TEC claims no responsibility for use of this plan by others.

1.1 PROJECT BACKGROUND

The Offsite WSA (Figure 1-1) is being investigated in accordance with IRP guidance. NAS Fort Worth (formerly Carswell Air Force Base) is currently undergoing property disposal/reuse pursuant to the Defense Base Closure and Realignment Act of 1990 and Round II of the Base Closure Commission deliberations. The area of study is being considered for property disposal. This investigation is being conducted to comply with a directive issued by Texas Natural Resource Conservation Commission (TNRCC) requesting RFIs of Solid Waste Management Units (SWMUs) located at NAS Fort Worth. One of the SWMUs identified was the WAS Waste Accumulation Area (No. 59). TEC will conduct the RFI to determine if activities performed at the WSA pose a potential threat to human health and the environment.

Previous investigations completed at the WSA reported that paint thinners and trichloroethylene (TCE) were being discharged at a rate of 5 to 10 gallons per year. The site was evaluated in a RCRA Facility Assessment performed by A.T. Kearney, Inc. (1989). The past and ongoing potential for release to soil and groundwater was identified as moderate because of the presence of TCE. An RFI was recommended for this unit because of the presence of TCE in the soil at this site.

A RI/FS Stage 2 (Radian, 1989) investigation was conducted at NAS Fort Worth, including the WSA. Low levels of TCE were present in the soil in the ditch near the shop. Hand auger boring advanced west of Building 8503 encountered limestone within a few feet of ground surface. Laboratory analysis revealed TCE to be present in the soil at concentrations ranging from non-detect (ND) to 0.0619 micrograms per gram ($\mu\text{g/g}$). Groundwater was not encountered in the overburden.

Results of the Stage 2 investigation indicate the presence of these indicator chemicals in at least one soil sample:

- Metals: antimony, arsenic barium, beryllium, cadmium, chromium, lead, nickel, selenium, and silver;
- PAHs: bis(2-ethylhexyl) phthalate, benzo(a)anthracene, and benzo(a)pyrene; and
- VOCs: benzene and toluene

An asbestos survey was completed that identified asbestos containing material (ACM) in six buildings at the WSA (USAF, 1993b). Complete documentation of all potential ACMs at the site was not performed..

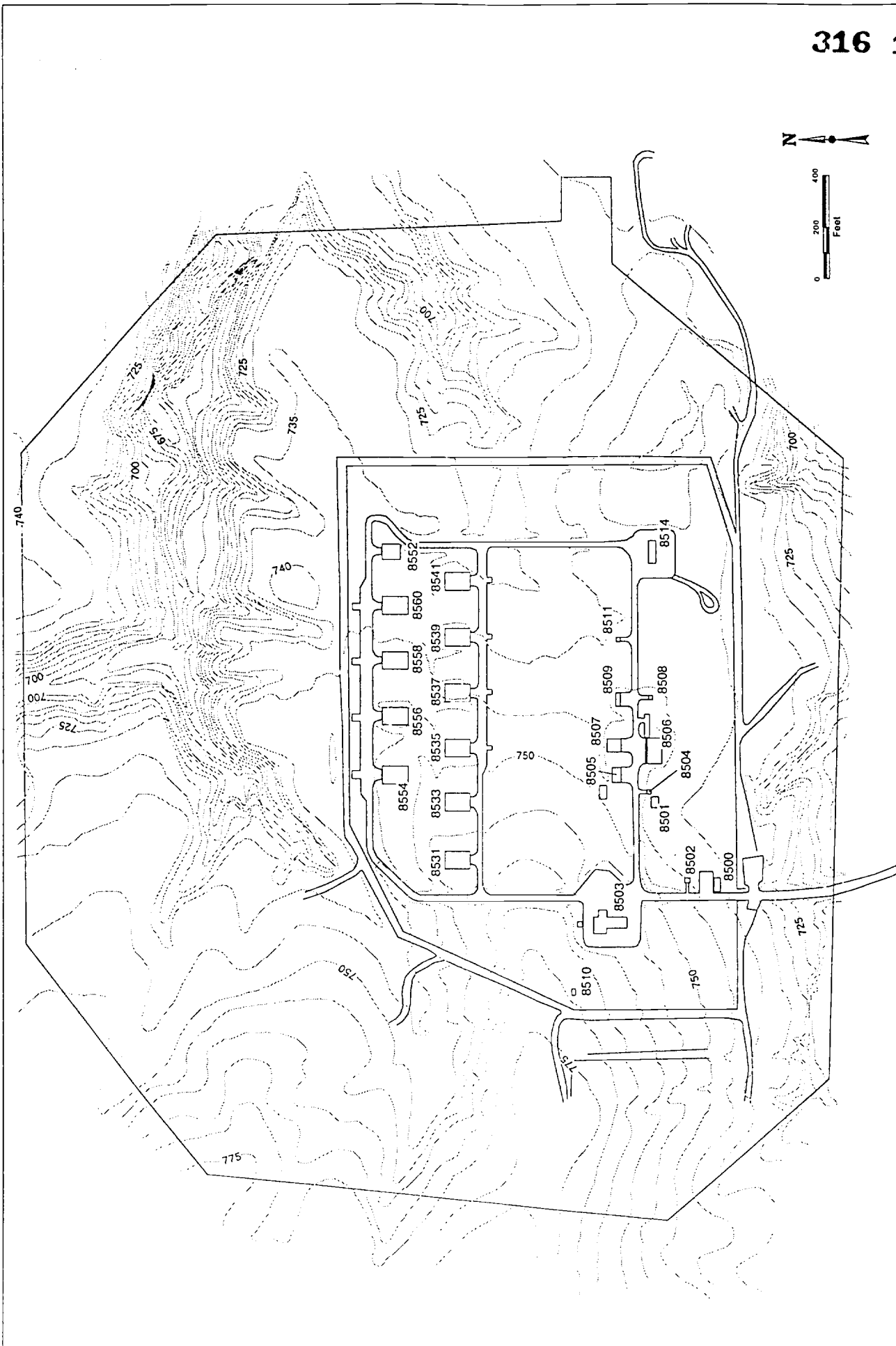


Figure 1-1 -- WSA Location Map

Date: November, 1996
 Project Manager: Bob Duffner
 Prepared By: WSM
 Project No: P-3109

A survey of the Explosive Ordnance Disposal (EOD) Range was conducted by personnel at the Department of Air Force, Ogden Air Logistics Center, Hill AFB. The survey was to determine if munition residue was present and to evaluate appropriate remedial actions and associated costs (USAF, 1993a). Small arms actuators and starter cartridges were observed in two burial pits. The survey team was unable to determine the size of the pits, so a sweep of the area was recommended. A radioactive burial pit was also found on the land. It was fenced off roughly 0.5 miles from the demolition range. A landfill containing household refuse was located on the site and the presence of TCE was confirmed in the soil.

Clearance of the EOD Range was conducted by EOD personnel between 16 August 1995 and 15 September 1995 (USAF, 1996b). The Range was thoroughly searched and determined to be cleared of all explosive ordnance and ordnance residue. The EOD Range was swept to a depth of 10 feet during the clearance using metal detectors. All metallic items were excavated and removed. No restrictions have been placed on future use of the land and the land, has been identified as legal land description according to EOD personnel. However, EOD personnel should be contacted if the land is to be used for activities other than livestock grazing and if there is the possibility of going below 0.5 to 1 foot deep. All material was removed from the on-site burial pits during the clearance.

Metcalf & Eddy (1993) was retained by the U.S. Air Force (USAF) to remove debris located at the waste dump at the Offsite WSA. The debris included non-hazardous material such as wooden pallets, used bomb crates, scrap metal, newspapers, loose sand, and other materials. In the initial characterization, three soil samples and four associated Quality Control samples were taken. The samples were analyzed for volatile organic compounds (VOCs), benzene, toluene, ethyl benzene, and xylene (BTEX), semi-volatile compounds (SVOCs), total petroleum hydrocarbons (TPH), gross alpha, gross beta, and metals. Review of laboratory analytical data did not indicate the presence of hazardous or radionuclear constituents above background values. In addition, most of the analytical results were below the method detection limits or regulatory levels. Based upon these results, the debris was treated as a non-hazardous waste.

All transformers with polychlorinated biphenyls (PCBs) concentrations exceeding 50 parts per million (ppm) have been replaced or retrofilled with PCB-free equipment to bring the PCB concentration to below 50 ppm (USAF, 1993b). All transformers at the WSA now have been labeled PCB-free.

A final status decommissioning survey was performed by the Armstrong Laboratory, Health Physics Branch (AL/OEBZ) for the AFB Conversion Agency (AFBCA) on 5 to 9 December 1994 (USAF, 1996c). The purpose of this survey was to demonstrate that all relevant radiological parameters satisfied established guideline values. Background radiation levels were measured to determine the magnitude of naturally occurring radioactivity within the WSA facilities. Fixed alpha/beta/gamma and x-ray contamination levels were assessed, as well as removable alpha/beta/gamma and tritium contamination. All swipe samples were well below USNRC standards for removable alpha/beta/gamma contamination. All measurements made with the alpha/beta/gamma instruments were below action levels. X-ray measurements did not significantly differ from ambient background levels. Therefore, this evaluation demonstrated that all of the

WSAs investigated meet the release criteria in accordance with USNRC Regulatory Guide 1.86. The WSA is considered releasable for public use.

Additional radiological investigations were conducted of Building 8531 (USAF, 1995 and USAF, 1996a) and report that radiation levels are below release criteria in accordance with U.S. Nuclear Regulatory Commission (USNRC) Regulatory Guide 1.86. The building is considered releasable for public use.

Three tubes (dry wells) containing low-level radioactive waste (LLRW) were buried 400 feet west of Building 8503. The dry wells and adjacent soils were excavated in May 1996. According to a visual inspection conducted by the Air Force before soil sampling took place, there was no evidence of any release of hazardous materials to the environment. The results of the soil sampling performed by Metcalf & Eddy (1996) have not been obtained therefore visual observations could not be confirmed.

Jacobs Engineering Group, Inc. will be conducting an RFI for Parcel D and Background Study (1996). Field work will be conducted in November and December 1996. The background study is being conducted in relation to total radium identified in excess of the Federal drinking water standards in the on-site potable water supply well (A.T. Kearney, 1989 and Radian, 1989). Surface soil samples will be collected during the WSA background investigation to determine if concentrations of total radium detected in the on-site well are attributable to the LLRW storage site or are naturally occurring background concentrations of radium-226 and radium-228. In addition, soils will be sampled for total extractable petroleum hydrocarbons (TEPH) to assess whether petroleum hydrocarbons have been released to the environment. Monitoring wells will be installed to evaluate whether radium has impacted groundwater quality in the supply well. Shallow wells will be installed within the fenced area of the WSA to evaluate background conditions.

1.2 PROJECT OBJECTIVES AND FIELD ACTIVITIES

The overall goal of this RFI will be to characterize environmental conditions at the Offsite WSA which will support closure of SWMU 59 and the disposal/reuse of the property. Specific objectives needed to achieve this goal include:

- Determination of the nature and extent of any potential equipment, structures, and soil contamination associated with SWMU 59;
- Assessment of the nature and extent of potential surface soil, subsurface soil, sediment and groundwater contamination resulting from other activities and/or sources at the offsite WSA;
- Characterization of potential surface and subsurface soil contamination related to potential leaks from previously removed USTs and past UST fueling operations;
- Identification and characterization of potential contaminants and/or hazardous constituents associated with buildings and structures;
- Characterization of potential threats to human health posed by any contamination identified; and
- Development of corrective measures needed to control, minimize or eliminate any contamination and/or hazardous constituents identified during the project.

1.3 SITE DESCRIPTION AND HISTORY

Geographical areas where field work will be performed will include:

- 22 buildings within the fenced area of the WSA;
- Outdoor material storage and maintenance areas;
- Waste accumulation area and Building 8503;
- Drainageways and seeps;
- Vehicle fueling area;
- Munition storage bunkers;
- Removed UST locations; and
- Bunker drains in front of munitions storage buildings.

1.3.1 Site Description

NAS Fort Worth is located in north-central Texas in Tarrant County, approximately 8 miles west of the downtown area of the City of Fort Worth (Figure 1-2). NAS Fort Worth property totals 2,555 acres and consists of a main station and two noncontiguous land parcels. The area surrounding NAS Fort Worth is predominantly suburban, including the residential areas of the City of Fort Worth, Westworth Village, and White Settlement.

The WSA is a 247 acre offsite facility that exists under the ownership and control of NAS Fort Worth. The WSA is located about 4 miles west of NAS Fort Worth, just north of White Settlement Road. The facility, built in 1956, consists of 247 acres of fee-owned land surrounded by an additional 264 acres of easements. The WSA is bordered by primarily rural property, with some ranches and farms nearby. A residential development is located south of White Settlement Road.

Facilities at the WSA include two munitions inspection shops, 16 ordnance storage buildings (including 11 igloos), an entry control building, an emergency power plant, an EOD Range, a small radioactive waste disposal facility, a water storage tank, and two water wells (see Figure 1-1).

1.3.2 Site History

The land area currently known as NAS Fort Worth was originally an earthen runway constructed to service an aircraft manufacturing facility. When established in 1942, the installation was referred to as the Tarrant Field Airdrome and was under the jurisdiction of the Gulf Coast Army Air Field Training Command. The installation mission was to provide transition training for B-24 bomber pilots.

The Strategic Air Command (SAC) assumed control of Tarrant Field Airdrome in 1946 and the installation served as the Headquarters (HQ) for the Eighth Air Force and as a heavy bomber base. The installation was renamed Carswell Air Force Base (AFB) in 1943 in honor of Major Horace S. Carswell, a City of Fort Worth native. HQ 19th Air

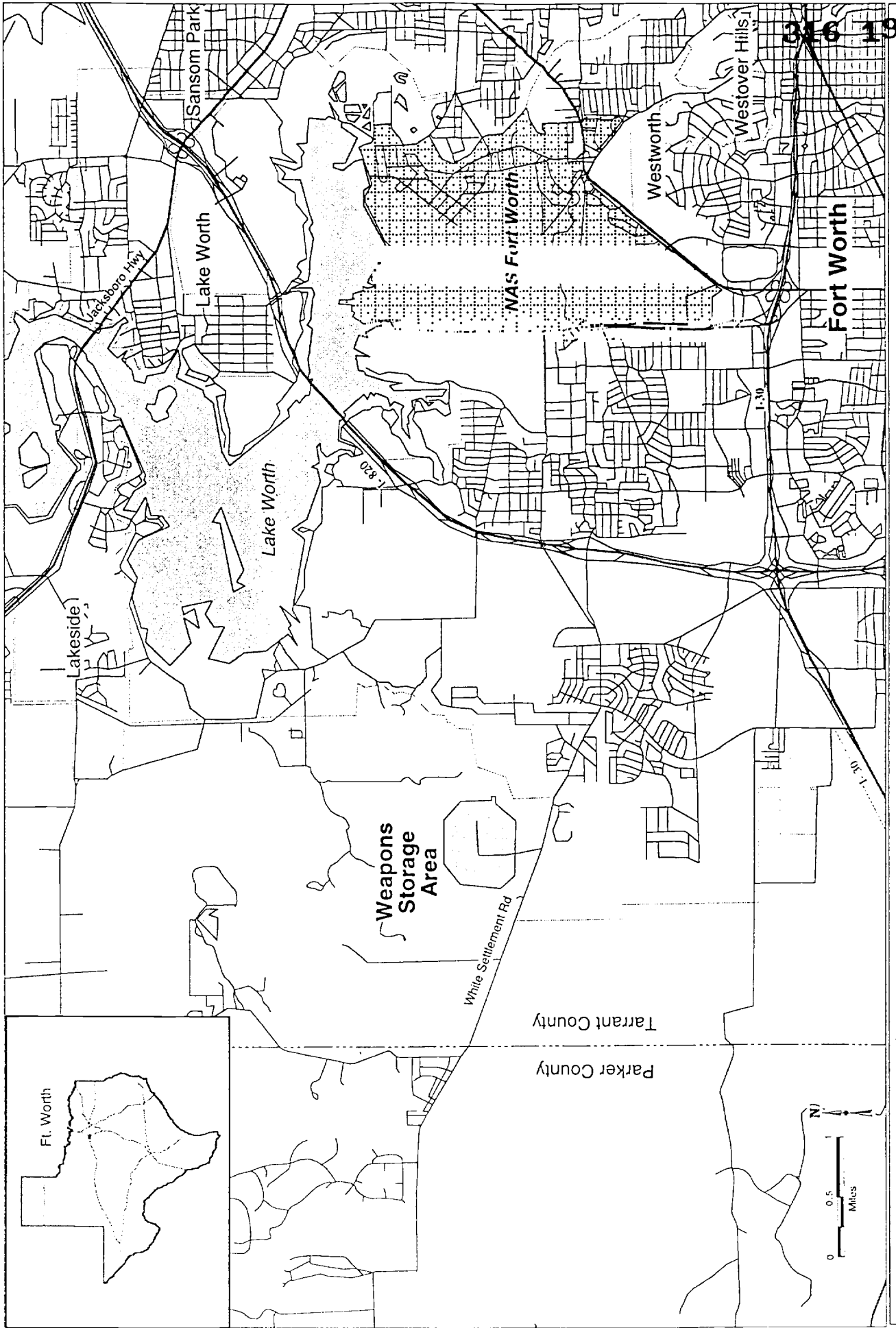


Figure 1-2 -- NAS Fort Worth Offsite Weapons Storage Area Vicinity Map

The Environmental Company, Inc.
 Project Manager: Bob Dulfner
 Prepared By: WSM
 Date: December, 1996
 Project No: P-3109

Division was located at Carswell AFB in 1951 and the installation became home base for B-52s and KC-135s in 1956. The Air Combat Command (ACC) assumed control of Carswell AFB in 1992 concurrent with the disestablishment of the SAC.

Carswell AFB was selected for closure and associated property disposal/reuse during Round II of Base Closure Commission deliberations pursuant to the Defense Base Closure and Realignment Act (DBCRA) of 1990. The planning process for closure and property disposal/reuse at Carswell AFB was initiated in 1992 and Carswell AFB officially closed on 30 September 1993.

The U.S. Navy assumed control of Carswell AFB on 1 October 1994 and renamed the installation NAS Fort Worth, JRB, Carswell Field (hereafter referred to as NAS Fort Worth).

2.0 PROJECT PERSONNEL

The overall organizational structure for TEC's Health and Safety Program appears in Table 2-1, and is discussed below.

The major personnel involved in TEC's Corporate Health and Safety Program organization include the

- President;
- Health and Safety Committee;
- CHSM;
- PHSMs;
- Regional/Subsidiary Office Safety Managers (OSMs); and
- SHSMs.

Descriptions of the roles and responsibilities accorded to each of these elements are detailed in the TEC Health and Safety Policy Manual (TEC, 1992).

The PHSM has distinct technical and financial management authority from general project management. Health and safety management authority is delegated from the TEC CHSM to the PHSM who has authority over this project.

The PHSM has absolute authority to halt the execution of this project for any nonconformance with health and safety policies detailed in this HSP. This authority is subject to concurrence by the CHSM. The PHSM must approve field activities prior to execution at the job site.

All TEC personnel participating in this project will have current Occupational Safety and Health Administration (OSHA) hazardous waste operator certification, standard first aid, and standard adult CPR. In addition, all TEC personnel at the NAS Fort Worth Off-Site WSA will be participating in a medical monitoring program. All personnel conducting asbestos and lead surveys will have Asbestos Hazard Awareness Training and Lead Hazard Awareness Training in addition to the programs identified above. Details of TEC's health and safety and medical monitoring programs are included in Appendices B and C, respectively.

2.1 SAFETY ORGANIZATIONAL STRUCTURE

The following table lists principal project personnel and corresponding telephone numbers.

Table 2-1. Principal Project Personnel

Title	Name	Phone Number
CHSM	Alistair J. Downie	(804) 295-4446
Project Manager	Robert Duffner, P.E.	(206) 557-7899
AFBCA POC	Olen Long, P.E.	(817) 731-8284
AFCEE COR	Charles Rice	(210) 536-6452
PHSM	To be determined	(804) 295-4446
Alternate PHSM	To be determined	(804) 295-4446
SHSM	To be determined	(804) 295-4446
Alternate SHSM	To be determined	(804) 295-4446

CHSM = Corporate Health and Safety Manager

COR = Contracting Officer's Representative

PHSM = Project Health and Safety Manager

POC = Point of Contact

SHSM = Site Health and Safety Manager

2.2 PERSONNEL RESPONSIBILITIES

The PM is responsible for ensuring that TEC and subcontractor personnel are aware of appropriate health and safety procedures, and ensuring that projects are performed with the utmost regard for the health and safety of all personnel involved. Project personnel have undergone health and safety training (Appendix B) and participate in the TEC medical monitoring program (Appendix C). All project personnel have a responsibility for accident prevention by following established safety procedures necessary to perform assigned work without injury. Violations which endanger lives, health, or welfare will not be tolerated.

General health and safety authority for TEC employees and subcontractors belongs to the CHSM. Day-to-day health and safety authority is delegated to the PHSM. The CHSM is responsible for ensuring that the TEC Health and Safety Policy Manual (TEC, 1992) has been implemented in all TEC projects including the project for which this HSP is developed. The CHSM resolves issues that cannot be resolved by the PHSM.

The PHSM is responsible for:

- Making decisions necessary for implementing and enforcing policies contained in this HSP;
- Ensuring that all project personnel are aware of, and comply with, the provisions of this HSP;
- Halting the project for noncompliance with this HSP;
- Auditing for compliance with the policies and procedures detailed in this HSP;
- Coordinating training and re-training personnel as necessary;
- Coordinating with subcontractor health and safety personnel; and
- Ensuring that subcontractors comply with this HSP.

To provide the most cost-effective and safe field operations, a SHSM will be assigned to the job site. The SHSM will be named by the PM subject to approval by the PHSM. Unless it is determined that the activities associated with a particular work assignment warrant the use of a full-time health and safety professional, the SHSM will be selected from the members of the assigned project team. The SHSM will be responsible for implementing this HSP, in addition to his/her regular responsibilities.

The SHSM will designate, with concurrence from the PHSM, an alternate SHSM when necessary. Designation of alternate SHSMs will be documented in the Field Log Book. The SHSM's and/or designated alternate's responsibilities include the following:

- Rig inspections;
- Calibration, setup, and maintenance of appropriate monitoring devices;
- Selection of Personal Protective Equipment (PPE);
- Monitoring daily weather conditions;
- Coordination and conduct of daily tailgate meetings;
- Proper emergency notification of NAS Fort Worth and AFCEE personnel;
- Oversight of TEC and subcontractor field personnel;
- Investigation of accidents and injuries; and
- Authority to stop field work if deemed necessary.

2.3 SUBCONTRACTORS

Subcontractors and their employees must comply with:

- All applicable OSHA standards;
- Other Federal, State, and local ordinances, statutes, and regulations;
- Safety practices standard in their industry; and
- Safety procedures followed by the facility owner or operator.

The subcontractors to be utilized for field work during this project include a:

- Surveyor; and
- Driller.

They will be required to work under the guidelines established in this HSP. TEC will require that work practices performed by subcontractors meet the requirements of the HSP. To ensure compliance, the subcontractors will provide documentation to the PHSM verifying that field personnel have necessary respiratory approval and OSHA-mandated training. TEC will provide a copy of this HSP to subcontractors prior to initiating field activities. Each subcontractor must complete the HSP Agreement and Acknowledgment Sheet provided in Appendix K for all field personnel and submit the completed sheet to the PHSM.

The SHSM or designated alternate will be on site at all times to ensure subcontractor compliance with this HSP. TEC reserves the right to stop work and restrict personnel from working for non-compliance with the HSP.

If a subcontractor chooses to implement their own HSP, the plan shall be consistent with the requirements of the following.

- 1) *OSHA Safety and Health Standards 29 CFR 1910 (General Industry)* U.S. Department of Labor, Occupational Safety and Health Administration. Hereafter, referred to as 29 CFR 1910. Available by calling 513-533-8236.
- 2) *OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response*. Final Rule, U.S. Department of Labor. Occupational Safety and Health Administration, December, 1991. Hereafter referred to as 29 CFR 1910.120.
- 3) *OSHA Safety and Health Standards 29 CFR 1926/1910 (Construction Industry)*, U.S. Department of Labor. Occupational Safety and Health Administration. 1985. Hereafter, referred to as 29 CFR 1926/1910.
- 4) *Standard Operating Safety Guidelines*, USEPA. Environmental Response Branch, Hazardous Response Support Division. Office of Emergency and Remedial Response, November 1984. Hereafter referred to as EPA Guidelines.
- 5) *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control. National Institute for Occupational Safety and Health. October 1985.

2.4 VISITORS/TRAINEES

Visitors/trainees entering this site are required to read and understand this HSP, and to verify their training and participation in a medical surveillance program to the PHSM. Forms in Appendices I and L must be read and signed by each visitor/trainee.

Once the signing of these forms is completed and the visitor is wearing the required PPE, the visitor may enter the exclusion zone (EZ). However, in most cases, visitors will be limited to the contamination reduction zone (CRZ) or clean/support zone.

Visitors/trainees will be escorted by a site representative.

General health and safety risks will be discussed during tailgate meetings conducted by the SHSM or designated alternate. Tailgate meetings will be held daily at the field site prior to initiating field activities. A checklist of topics to be covered is in Appendix M. The SHSM or alternate will discuss personnel responsibilities, planned investigation and presumed potential hazards, PPE, monitoring, emergency scenario plans, evacuation routes, and location/operation of kill switches, fire extinguishers, eye washes, and first aid kits.

3.1 HAZARDOUS MATERIALS AND SITE CONTAMINANTS

The suspected on-site contaminants are listed in Tables 3-1 and 3-2. Representative Material Safety Data Sheets (MSDSs) for these substances are provided in Appendix J.

Exposure risks at the NAS Fort Worth WSA are expected to be greatest for on-site workers in direct contact with potentially contaminated media. Major mechanisms for potential exposure are via inhalation, ingestion, or skin absorption.

Radiation has been detected at the NAS Fort Worth WSA from disposal of instruments containing radium. These sites have been cleared of radioactive waste and radiation levels are below release criteria (USAF, 1996a; USAF, 1996b; M&E, 1996a). TEC personnel will wear radiation level monitoring badges as part of the medical monitoring program.

Chemical hazard procedures are provided in Appendix F for those chemicals that are typically used for sampling equipment decontamination.

There is potential for bites from snakes, insects, and rodents. In particular, rattlesnakes are found at the NAS Fort Worth WSA. Extreme caution should be exercised in areas likely to contain rattlesnakes, such as the drainage areas. More detailed information concerning biological hazards and controls are also provided in Appendix F.

3.2 PHYSICAL SAFETY HAZARDS

Stress, as a physical hazard, can contribute significantly to accidents or can harm workers. Employees will use proper techniques during lifting and transport of heavy objects and equipment. Detailed information regarding proper lifting procedures are outlined in Appendix D. Employees will minimize eye and ear hazards by wearing safety glasses and ear plugs when necessary. These hazards will be most prevalent during advancement of soil borings, installation of monitoring wells, and collection of soil and groundwater samples. In addition to safety glasses and ear plugs, portable eyewash stations and other precautionary measures will be provided as needed to reduce potential worker hazards.

The term stress denotes physical (mechanical, heat, cold, pathogen, injury) and psychological (fear, anxiety, crises, joy) forces that are experienced by individuals. Appendix D contains more detailed procedures for recognizing common physical safety hazards such as stress or other common work site physical safety hazards.

Table 3-1. Vapor Properties of Hazardous Compounds Potentially Existing On-Site

Compound	CAS #	Ionization Potential ² (eV)	VP ² @ 20 °C (mmHg)	Vapor Density ¹ (air=1)	Respiratory Exposure Levels			Explosive Levels		
					TWA ^{2,3} or TLV (ppm)	STEL ^{2,3} (ppm)	Odor Threshold ² (ppm)	LEL ² (%)	UEL ² (%)	IDLH ² (ppm)
Acetone	67-64-1	9.69	180	2.0	250	1000	3.6-653	2.5	12.8	2500
Asbestos	1332-21-4	NA	0	NA	0.2 fibers/cc	1.0 fiber/cc ³	NA	NA	NA	NA
Benzene	71-43-2	9.24	75	2.8	0.1	1	34-119	1.2	7.8	500
Benzo(a)anthracene	56-55-3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	50-32-8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	117-81-7	NA	NA	13.5	5 mg/m ³	10 mg/m ³	NA	NA	NA	NA
Chromium metal	7440-47-3	NA	0	0	0.5 mg/m ³	NA	NA	NA	NA	250 mg/m ³ (as Cr)
Chromium (III) oxide	1308-38-9	NA	0	0	0.5 mg/m ³	NA	NA	NA	NA	250 mg/m ³ (as Cr)
Dichloroethane	75-34-3	11.06	182	NA	100	NA	49-1359	5.4	11.4	3000
Dichloroethylene	540-59-0	9.65	180-265	NA	200	NA	0.08-17	5.6	12.8	1000
Fuel Oil #1 (Kerosine)	8008-20-6	NA	5 (100°F)	NA	100 mg/m ³	1	NA	0.7	5	NA
Diesel fuel #2	68476-34-6	NA	1	>1	TLV = 400	NA	NA	0.4	6	NA
Ethyl benzene	100-41-4	8.76	7	NA	100	125	0.092-0.6	0.8	6.7	800
Gasoline	8006-61-9	NA	38-300	3-4	300	500	0.25	1.4	7.6	100
Hexane	110-54-3	10.18	124	3	50	NA	65-248	1.1	7.5	1100
Lead	7439-92-1	NA	0	0	0.05 mg/m ³	NA	NA	NA	NA	100 mg/m ³
Methanol	67-56-1	10.84	96	1.11	200	250	4.2-5960	6	36	6000
Methyl ethyl ketone	78-93-3	9.54	78	2.5	200	300	1-30	1.4	11.4	3000
Nitrobenzene	98-95-3	9.92	0.3 (77°F)	4.24	1	NA	0.37	1.8	NA	200
Nitrotoluene	99-08-1	9.48	0.1	NA	2	NA	0.05	1.6	NA	200
RDX (cyclonite)	121-82-4	NA	0.0004 (230°F)	NA	1.5 mg/m ³	3 mg/m ³ (skin)	NA	NA	NA	NA
Tetrachloroethylene	127-18-4	9.32	14	5.83	100	685 mg/m ³	47	NA	NA	150
Toluene	108-88-3	8.82	21	3.2	100 (skin)	150	0.16-40	1.1	7.1	500
Trichloroethylene	79-01-6	9.45	58	4.54	100	537 mg/m ³	82	8 (77°F)	10.5 (77°F)	1000
Vinyl Chloride	75-01-4	9.99	0.1	NA	1	NA	10-20	3.6	33	NA
Xylenes	1330-20-7	8.56	7-9	3.7	100	150	0.05-200	1.1	7	900

1 DoD, 1994.

2 NIOSH, 1994.

3 OSHA, 1996.

eV = electron volt

IDLH = Immediately Dangerous to Life and Health

LEL = Lower Explosive Limit

ppm = parts per million

NA = Not Available

STEL = Short-Term Exposure Limit

TLV = Threshold Limit Value

TWA = Time-Weighted Average

UEL = Upper Explosive Limit

VP = Vapor Pressure

Table 3-2. Health Hazards of Hazardous Compounds Potentially Existing On-Site

Compound	CAS #	Carcinogen	Physical Description ^{1,2}	Routes ^{1,2}	Symptoms ^{1,2}
Acetone	67-64-1	No	Clear colorless liquid with a fragrant, mint-like odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates eyes, nose, throat; headache, dizziness, central nervous system depressant/depression, dermatitis
Asbestos	1332-21-4	Yes	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.	Inhalation; Ingestion; Skin and/or eye contact	Asbestosis (chronic exposure): dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing; irritates eyes
Benzene	71-43-2	Yes	Colorless to light-yellow liquid with an aromatic odor.	Inhalation, Skin Absorption, Ingestion, Skin and/or eye contact	Irritates eyes, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone marrow depressant
Benzo(a)anthracene	56-55-3	Yes	Pale yellow crystal.	Inhalation, Ingestion, Skin and/or eye contact	Irritates eyes and/or skin and respiratory tract
Benzo(a)pyrene	50-32-8	Yes	Yellowish solid.	Inhalation, Ingestion, Skin and/or eye contact	Irritates eyes and/or skin and respiratory tract, burns skin
Bis(2-ethylhexyl) phthalate	117-81-7	Yes	Clear liquid with a mild odor.	Inhalation, Ingestion, Skin and/or eye contact	Irritates skin and respiratory tract; nausea, vomiting, diarrhea
Chromium Metal	7440-47-3	No	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.	Inhalation; Ingestion; Skin and/or eye contact	Irritates eyes, skin; lung Fibrosis (histologic)
Chromium (III) Oxide	1308-38-9	No	Bright green, extremely hard crystals with no odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates mucous membranes, respiratory tract, and skin

Table 3-2. Health Hazards of Hazardous Compounds Potentially Existing On-Site

Compound	CAS #	Carcinogen	Physical	Routes ^{1,2}		Symptoms ^{1,2}
			Description ^{1,2}			
Dichloroethane	75-34-3	No	Colorless, oily liquid with a chloroform-like odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates skin; central nervous system depressant/depression; liver, kidney, lung damage	
1,2-Dichloroethylene	540-59-0	No	Colorless liquid (usually a mixture of cis & trans isomers) with a slightly acrid, chloroform-like odor.	Inhalation, Ingestion, Skin and/or eye contact	Irritating to eyes and respiratory system; central nervous system depression	
Fuel Oil #1 (Kerosine)	8008-20-6	Yes	Colorless to yellowish, oily liquid with a strong, characteristic odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates eyes, skin, nose, throat; burning sensation in chest; headache, nausea, weakness, restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonia (aspir liq)	
Diesel Fuel #2	68476-34-6	No	Clear or yellow liquid with a characteristic odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates eyes, skin; may be fatal if swallowed	
Ethyl benzene	100-41-4	No	Colorless liquid with an aromatic odor.	Inhalation, Ingestion, Skin and/or eye contact	Irritates eyes, mucous membranes; headache; dermatitis; narcosis, coma	
Gasoline	8006-61-9	Yes ²	Red-orange liquid with a pungent odor.	Inhalation, Skin Absorption, Ingestion, Skin and/or eye contact	Irritates eyes, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone marrow depressant	
Hexane	110-54-3	No	Colorless liquid with a gasoline-like odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates eyes, nose; lightheadedness; nausea, headache; peripheral neur: numbness, extremities, muscle weakness; dermatitis; giddiness; chemical pneumonia (aspir liq)	

Table 3-2. Health Hazards of Hazardous Compounds Potentially Existing On-Site

Compound	CAS #	Carcinogen	Physical Description ^{1,2}	Routes ^{1,2}	Symptoms ^{1,2}
Lead	7439-92-1	No	A heavy, ductile, soft, gray solid.	Inhalation, Ingestion, Skin and/or eye contact	Weakness, lassitude, insomnia; facial pallor; pal eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist and ankles; hypertension; encephalopathy; kidney disease, nephropathy;
Methanol	67-56-1	No	Colorless liquid with a characteristic pungent odor.	Inhalation; Skin absorption; Ingestion; Skin and/or eye contact	Irritates eyes, skin, upper respiratory system; headache, drowsiness, dizziness, vertigo, lightheadedness, nausea, vomiting; visual disturbance, optic nerve damage (blindness); dermatitis
Methyl ethyl ketone	78-93-3	No	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.	Inhalation; Ingestion; Skin and/or eye contact	Irritates eyes, skin, nose; headache; dizziness; vomiting; dermatitis
Nitrobenzene	98-95-3	No	Yellow, oily liquid with a pungent odor like a paste shoe polish.	Inhalation; Skin absorption; Ingestion; Skin and/or eye contact	Irritates eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects
Nitrotoluene	99-08-1	No	Yellow liquid with a weak, aromatic odor.	Inhalation; Skin absorption; Ingestion; Skin and/or eye contact	Anoxia, cyanosis; headache, weakness, dizziness; ataxia; dyspnea; tachycardia; nausea, vomiting
RDX (Cyclonite)	121-82-4	No	White, crystalline powder. [Note: A powerful high explosive.]	Inhalation; Skin absorption; Ingestion; Skin and/or eye contact	Irritates eyes, skin; headache, irritability, fatigue, weakness, tremor, nausea, dizziness, vomiting, insomnia, convulsions

Table 3-2. Health Hazards of Hazardous Compounds Potentially Existing On-Site

Compound	CAS #	Carcinogen	Physical Description ^{1,2}	Routes ^{1,2}	Symptoms ^{1,2}
Tetrachloroethylene	127-18-4	Yes	Colorless liquid with a mild, chloroform-like odor.	Inhalation, Skin Absorption, Ingestion, Skin and/or eye contact	Irritating to eyes, nose, throat; nausea; flush face, neck; vertigo, dizziness, incoordination; head, somnolence; skin erythema; liver damage
Toluene	108-88-3	No	Colorless liquid with a sweet, pungent, benzene odor.	Inhalation, Skin Absorption, Ingestion, Skin and/or eye contact	Irritates eyes, nose; fatigue, weakness; confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; nervousness, muscle fatigue, insomnia; paresthesia; dermatitis
Trichloroethylene	79-01-6	Yes	Colorless liquid (unless dyed blue) with a chloroform-like odor.	Inhalation, Skin Absorption, Ingestion, Skin and/or eye contact	Irritating to eyes, skin; headaches, vertigo; visual distortion, fatigue, giddiness, tremors, somnolence, nausea, vomiting; dermatitis; cardiac arrhythmia, paresthesia; liver injuries
Vinyl chloride	75-01-4	Yes	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.	Inhalation; Skin and/or eye contact (liq)	Weakness; abdominal pain, Gastrointestinal bleeding; enlarged liver; pallor or Cyanosis of extremities, liq. frostbite
Xylenes	1330-20-7	No	Colorless liquids with an aromatic odor.	Inhalation, Skin Absorption, Ingestion, Skin and/or eye contact	Dizziness, excitement, drowsiness, incoordination, staggering gait; irritates eyes, skin, nose, throat; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

1 NIOSH, 1994.

2 DoD, 1994.

NA = Not Available

The most common types of stress that affect field personnel are heat stress and cold stress. In addition to temperature stress, noise associated with drilling operations is a potentially serious hazard to on-site workers.

Heat Stress. Temperature is anticipated to be a potentially serious hazard during this project because the temperature can approach 100 °F. Regular monitoring and other preventative measures are vital. Appendix E contains more detailed procedures regarding heat stress.

Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventative heat stress management. The following steps will be taken.

- **Have workers drink 16 ounces** of water before beginning work, such as in the morning or after lunch. Urge workers to drink 16 to 32 ounces of fluids per hour, for a total of 1 to 2 gallons per day. Provide a cool, shaded, or air-conditioned area for rest breaks and discourage the intake of coffee during working hours. Alcohol is prohibited during working hours. Both alcohol and coffee dehydrate the body and could affect its natural cooling systems. Monitor for signs of heat stress.
- **Acclimate workers to site work conditions** by slowly increasing workloads, i.e., do not begin with extremely demanding activities.
- **Provide cooling devices** to aid natural body ventilation where and when necessary. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear which acts as a wick to help absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
- **In hot weather**, consider conducting labor-intensive field activities during the early morning or evening hours.
- **Ensure that adequate shelter is available** to protect personnel against heat which can decrease physical efficiency and increase the probability of heat stress.
- **Good hygienic standards** must be maintained by frequent changes of clothing. Persons who notice skin problems should immediately consult medical personnel.

Prolonged exposure to an extremely hot, humid environment may lead to heat cramps, heat exhaustion, or heatstroke. Recognizing the signs of various forms of heat stress and providing immediate treatment is crucial to maintaining the health of site personnel. Table 3-3 provides a summary of the symptoms and treatment of the three forms of heat stress.

Table 3-3. Symptoms and Treatment of Heat Cramps, Heat Exhaustion, and Heatstroke

Type of Heat Stress	Symptoms	Treatment
Heat Cramps	Profuse sweating, severe muscle cramps, and pain; especially in the muscles of the legs or the abdomen. Faintness, dizziness, and exhaustion may be present.	Remove the victim to a cool, shady location and give them a salty liquid. Rest and inactivity are important. Gently stretch the leg muscles by pulling the toes up to relieve the pain. The victim should rest for at least 12 hours prior to resuming any additional activity. Do not massage the muscle or give salt tablets.
Heat Exhaustion	The victim is listless, fatigued, and faint. Skin is ashen, cool, and damp, and the victim is often sweating profusely. Weakness, dizziness, headache, nausea, blurred vision, irritability, and mild muscular cramps are common. Temperature is normal and pulse is thready and elevated, possibly to 100 beats per minute. In severe cases the victim is in a semiconscious or unconscious condition.	Loosen clothing and place the victim in a reclining position in a cool, shady location. Administer cool water or a saltwater solution by mouth. Cool the person down by removing the clothing and sponging with cool cloths. The victim should rest for at least 24 hours. Normally this condition is easily reversed and nonfatal; however, if the person does not respond well to treatment or appears overly fatigued, refer immediately to a hospital.
Heatstroke	The onset of heatstroke is rapid. Initially, the person experiences headache, nausea, and weakness. Later, signs of confusion, lack of coordination, and lapse into unconsciousness may occur. Skin is hot, flushed, and dry, and the person appears feverish. Pulse rate is high, up to 160, and temperature is elevated to 105 °F to 110 °F.	The victim's temperature must be immediately reduced to below 100 °F. Immerse in a cool tub of ice water, use an alcohol rub, or cover with wet sheets and/or blankets soaked in cold water. Vigorous massaging with cold cloths or ice cubes is valuable in reducing the temperature. When temperature is reduced, keep the victim in a cool, well-ventilated area. Immediately obtain an ambulance and medical assistance. <i>Caution:</i> Prolonged cold after temperature has been reduced may cause hypothermia.

Breyfogle, 1993.

Cold Stress. Severely cold temperatures are not anticipated.

Noise. Noise is a hazard that is usually overlooked. Noise is a hazard because it interferes with normal communication between personnel. It may startle or distract workers. Noise can also produce physical damage to the ear that may cause pain and temporary or permanent hearing loss.

There are three classes of noise that are typically associated with drilling operations: continuous noise, intermittent noise, and impact-type noise. Continuous noise is heard when the drill rig is running; intermittent noise occurs when air compressor or pumping equipment is in use; an impact-type noise is produced by sampling hammers and driving tools.

Sounds vary in intensity and are measured in decibels (dB). Prolonged exposure to noise above 90 dB from heavy equipment can cause hearing loss characterized by the inability to hear certain sounds. Hearing loss will be minimized by using disposable or reusable ear plugs or ear muffs.

3.3 OTHER RISKS

The CHSM, PHSM, and/or SHSM will stop field activities for noncompliance with this HSP, or if job-site conditions become unsafe. Field activities can resume only after the deficiency has been corrected, and all issues have been resolved. In most instances, the resolution occurs at the project level. The responsibility for resolving conflicts lies first with the SHSM, and ultimately with the CHSM. The CHSM, PHSM, and/or SHSM shall also suspend participation of subcontractors in job-site activities for violating any provision of this HSP.

The CHSM, PHSM, and/or SHSM shall immediately advise the PM of the reason(s) for suspending operations, and shall notify additional individuals, as necessary, of the action. The PHSM, CHSM, and/or SHSM may not suspend the operations of any parties that are not in a direct contractual relationship with TEC, such as the U.S. Environmental Protection Agency (USEPA) or State of Texas personnel, or other construction, cleanup, or consulting firms; however, they shall make a good faith effort to inform these individuals of any unsafe practices or conditions they have observed.

Field activities performed by TEC and subcontractors shall be suspended if the CHSM, PHSM, or SHSM judges that there is potential harm to a third party.

3.4 PERSONAL PROTECTIVE EQUIPMENT

This section provides a general description of PPE and the requirements for this project. Safe and efficient operations on hazardous waste projects require careful selection and use of protective clothing. The SHSM or designated alternate is responsible for determining the level of PPE required.

In selecting protective clothing, the following requirements should be met.

- **Chemical resistance:** the clothing must maintain its structural integrity and protective qualities.
- **Strength:** the clothing must be resistant to tears, punctures, and abrasions.
- **Flexibility:** the clothing must be easy to move and work in.

The two most significant effects of chemicals on protective clothing are **permeation**-the process by which a chemical moves through protective materials, and **degradation**-the loss of physical properties of the material. It is important to understand that a chemical may permeate a material without degrading the material. **Penetration** (the movement of chemicals through stitched seams, zippers, and other imperfections) is also significant.

For this project, use of modified Level D PPE is anticipated. Modified Level D Protection includes:

- Latex/nitrile gloves for selected tasks;
- Boots/shoes: leather or chemical-resistant, steel toe, and shank;
- Standard work uniform and/or coveralls;
- Radiation badge, where necessary;
- Safety glasses, where necessary;
- Ear protection, where necessary; and
- Hard hat, where necessary.

The following criteria for work conditions correspond to the requirement of Modified Level D Protection.

- Contaminants are not present, or contaminants are present in the breathing zone below levels where there is evidence of adverse health effects, such as below the Threshold Limit Value (TLV) or Permissible Exposure Limit (PEL); and
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

If more extensive contamination is encountered during field operations, selection of PPE will be reviewed and appropriate steps will be taken to ensure that worker safety is maintained. The need for upgrading will be based primarily on air monitoring, which is described in the next section.

3.5 AIR MONITORING

Routine ambient air monitoring for organic vapors will serve as the basis for selecting the appropriate level of PPE. Most ambient air monitoring will be performed during drilling operations and will focus on the breathing zone of on-site workers. A photoionization detector (PID) equipped with a 10.2 electron volt (eV) lamp will be used to obtain measurements at least hourly during intrusive site activities or as needed with changes in drilling or site conditions. Additional monitoring will be conducted

periodically throughout the day at the subsurface soil sampling locations. Air monitoring is required for field activities that significantly disturb surface soil and for verifying that site control procedures are minimizing the spread of contaminants. The support zone (SZ) will be periodically monitored for air contaminants using a PID. Increased concentration of contaminants in air or other environmental media may indicate ineffective decontamination procedures. The Field Sampling Plan (FSP) for this RFI contains calibration procedures and forms for recording air monitoring results and calibration data.

The level of protection will be continually assessed while monitoring the working zone of on-site personnel. As a guide for selecting levels of protection in an unknown environment, the values shown in Table 3-4 will be used. If the substances are known, the TLV or PEL will be used for organic vapors. If sustained PID readings greater than 5 ppm are encountered in the breathing zone, a Draeger tube reading for benzene will be taken.

Table 3-4. Air Monitoring Action Levels

Concentrations of Organic Vapor in Breathing Zone	Action
0 - 10 ppm ¹	Modified Level D protection
10 - 50 ppm ¹	Level C protection
>50 ppm ¹	Stop work
Asbestos in Breathing Zone	Action
Non-friable asbestos	Modified Level D Protection
Friable asbestos	Level C Protection
Lead in Breathing Zone	Action
Collecting peeling paint	Modified Level D Protection
Use of heat gun or scraper	Level C Protection
Radiation	Action
3 to 5 times the background radiation	Notify PHSM or SHSM

1. Unless benzene and/or vinyl chloride are detected; then 1 ppm benzene or vinyl chloride based on the PELs for these constituents.

Action levels for lead-based paint and asbestos collection (Table 3-4) are based on the potential for the collection method or media to create dust or emit vapors in the breathing zone.

Data will be collected on background radiation levels at the site using a radiation meter capable of measuring alpha, beta, and gamma radiation. After baseline background radiation levels are established, the radiation meter will be set to alert personnel should radiation levels in the immediate vicinity of field operators exceed background levels. Table 3-4 summarizes action levels for radiation detected at the WSA. Work will continue with elevated radiation exposure rates; however, if the exposure rate increases to 3 to 5 times above background, or exceeds 250 micro Roentgens per hour ($\mu\text{R/hr}$) (250 counts per minute (cmp)), the field team leader will notify the PHSM and/or SHSM. If levels exceed 2 milli Roentgens per hour (mR/hr) (2000 cpm), the area exhibiting elevated readings will be evacuated and a radiation exclusion zone (REZ) established. Work may resume at the site only with continuous radiation monitoring and approval of the PHSM and/or SHSM.

If ambient air monitoring results indicate that Level B protection will be required to continue drilling operations, field work will stop and AFBCA and AFCCE officials contacted.

3.6 GENERAL WORK RULES

Field work will be conducted only during daylight hours unless adequate lighting is provided. The "buddy" system will be observed if site personnel are required to wear respiratory protection.

Entry and exit into the EZ (exclusion zone), CRZ (contamination reduction zone), and SZ (support zone) will be restricted to authorized personnel. Personnel entering the EZ must be wearing the required minimum PPE and must exit the area via the decontamination station (see Section 5.5).

Eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated. Contact lenses may not be worn in the EZ. All field personnel requiring corrective lenses must provide their own prescription glasses and lenses that may be fitted into the respiratory masks.

Hands must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activity. A supply of clean water or disposable handwipes will be available on site at all times.

No excessive facial hair, which may interfere with a satisfactory fit of the mask-to-face seal, will be allowed on personnel required to wear respiratory protective equipment.

Contact with contaminated or potentially contaminated surfaces shall be avoided. Field personnel will be instructed to avoid walking through puddles, mud, and other discolored surfaces, and to minimize equipment and personal contact with site soils whenever possible. Personnel assigned for field activities will be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.

4.0 FIELD OPERATIONS

Appendices A through H describe potential hazards, PPE, training, and monitoring programs. Forms, tailgate meeting topics, and MSDSs are contained in Appendices I through N. Operational procedures are detailed in Appendices O-Q. At a minimum, the following topics are addressed in the Appendices:

- Required PPE (Appendix A);
- Training (Appendix B);
- Monitoring (Appendix C);
- Physical hazards (Appendix D and E);
- Chemical and biological hazards (Appendix F);
- Decontamination procedures (Appendix G); and
- Work practices (Appendix H).

Major field operations anticipated in this project include:

- Soil Borings (Appendix O);
- Monitoring Well Installation/Development (Appendix P);
- Monitoring Well Purging/Sampling (Appendix Q);
- Asbestos and Lead-Based Paint Survey (Appendix R); and
- Metals and Explosive Residues Survey (Appendix S).

If additional field operations are required, this HSP will be modified as deemed necessary by the CHSM, PHSM, or SHSM. Field team members shall be required to inform the PM of any modifications to planned field operations. As this HSP is modified, project personnel will read the modifications and document their review.

Table 4-1 briefly summarizes each field operation. Level of effort (including required personnel and duration), task description, and type of waste generated are included.

Table 4-2 contains summaries of selected requirements for field operations. Detailed information is contained in Appendices O, P, and Q.

Table 4-1. Field Operation Task Descriptions and Requirements

Field Operation	Required Personnel	Estimated Duration	Type of Waste	Description
Soil Borings and Geoprobe Explorations	Hydrogeologist Geologist	2 months	Soil cuttings Groundwater	Licensed geologist, hydrogeologist, or geotechnical engineer will supervise drilling. There is a possibility that floating petroleum product will be encountered. Hollow stem auger and direct push techniques will be used to advance borings.
Monitoring Well Installation/Development	Hydrogeologist Geologist	2 weeks	Soil cuttings Groundwater	Licensed geologist, hydrogeologist, or geotechnical engineer will supervise installation/development. There is a possibility that floating petroleum products will be encountered; therefore shallow monitoring wells will be screened across the water table. All monitoring well installations will be designed to conform to AFCEE and State of Texas standards.
Monitoring Well Purging/Sampling	Hydrogeologist Geologist	2 weeks	Groundwater	Purging will be performed to evacuate water that has been stagnant in the well and may not be representative of aquifer conditions. Sampling will proceed after pH, temperature, and electrical conductance have stabilized (approximately three well volumes). If these variables do not stabilize, up to three additional volumes will be removed and sampling will proceed.
Asbestos and Lead-Based Paint Survey	Environmental Scientist	1 week	Asbestos and lead dust on towlette	A Certified Asbestos Inspector will conduct the asbestos and lead-based paint survey. Samples of materials potentially containing asbestos or lead will be collected and sent to the laboratory for analysis.
Metals and Explosive Residues Survey	Environmental Scientist	1 week	Towelette	Wipe samples will be collected and tested for the presence of metals and explosive residues to characterize potential building contamination.

Table 4-2. Field Operation Health and Safety Requirements

Field Operation	Air Monitoring Type	Air Monitoring Frequency	Required PPE Level	Critical PPE	Possible Hazards
Soil Boring and Geoprobe Explorations	PID	Hourly	Modified Level D	Safety glasses, ear plugs, latex/nitrile gloves, steel-toed safety shoes, hard hat	Electrical hazards, drilling rig and associated drilling equipment such as auger flights and drill rods, noise, heavy lifting, dust, exposure to chemical contaminants
Monitoring Well Installation/Development	PID	One well bore volumes	Modified Level D	Safety glasses, latex/nitrile gloves	Electrical hazards, drilling rig and associated drilling equipment such as auger flights and drill rods, noise, heavy lifting, exposure to chemical contaminants
Monitoring Well Purging/Sampling	PID	One well bore volumes	Modified Level D	Safety glasses, latex/nitrile gloves	Heavy lifting, exposure to chemical contaminants
Asbestos and Lead-Based Paint Survey	NA	NA	Modified Level D; Level C	Safety glasses, latex/nitrile gloves, respirator with HEPA cartridge and possibly organic vapor cartridge (Level C only)	Exposure to carcinogenic hazards; Level C will be used when friable asbestos is present or paint scrapings are being obtained (use HEPA cartridge) or when using a heat gun (also use organic vapor cartridge)
Metals and Explosive Residues Survey	NA	NA	Modified Level D	Safety glasses, latex/nitrile gloves	Exposure to chemical contaminants

¹ Only during hammer operation.

5.0 SITE CONTROL

Access control and decontamination at hazardous waste sites and operations are essential for maintaining the health and safety not only for workers but also for the community.

The field activities required for responding to environmental incidents involving hazardous substances may contribute to the migration of contaminants to unaffected areas. Response personnel and equipment may become contaminated and inadvertently carry the material into clean areas. Material may become airborne due to its volatile nature; disturbed contaminated soil may be wind-blown.

Contamination control procedures will be used to minimize the transfer of hazardous substances. Two methods will be used: establishment of work zones (access control) and removing contaminants from on-site personnel and equipment (decontamination). Decontamination procedures are discussed in Sections 5.5 and 5.6.

Access to the site is limited and control and security are provided by a caretaker located along the access road (White Settlement Road) to the NAS Fort Worth WSA. TEC's responsibility for access and control will be limited to the actual physical location where field work is occurring. Barrier tape will be used to properly delineate areas where intrusive investigations are conducted.

The SHSM has the following site control responsibilities.

- Limit access to the sampling location(s) and post appropriate warning signs or caution tape where required.
- Ensure that "buddy system" requirements of 29 CFR 1910.120 are followed.
- Keep a copy of this HSP readily available for on-site field personnel and visitors.
- Establish on-site communications consisting of the following:
 - Line of sight,
 - Agreed-upon hand signals or two-way radio, and
 - Air horn or other available alarm.
- Establish off-site communications using two-way radio and/or telephone.
- Determine wind direction.
- Monitor the air for hazardous conditions.
- Establish and delineate contiguous work zones (exclusion, contamination reduction, and clean/support), the latter two zones should be upwind of the exclusion zone unless obstacles make it impractical.
- Establish decontamination and waste disposal procedures.

5.1 SITE ACCESS RESTRICTIONS

The job site must be controlled to minimize the possibility of exposure to any contaminants present and their transport off site by personnel or equipment.

These problems will be reduced or eliminated in a number of ways, including:

- Setting up security and physical barriers such as caution tape to exclude unnecessary personnel;
- Minimizing the number of personnel and equipment on site to be consistent with effective operations;
- Establishing control points to regulate access to work zones; and
- Conducting operations in a manner to reduce the exposure of personnel and equipment and to eliminate the potential for airborne dispersion.

5.2 OFF-SITE CONTAMINATION CONTROL

Zones on the site will be delineated where prescribed operations occur. Zones in this project may be contiguous or non-contiguous based on conditions and activities that will be conducted at the site. Movement of personnel and equipment between zones and onto the site itself will be limited by access control points.

By these means, contamination will be expected to be contained within certain relatively small areas on the site to minimize its potential spread. Three contiguous zones will be used for full site operations:

1. The Exclusion Zone (minimum 10 foot radius from drill rig);
2. The Contamination Reduction Zone; and
3. The Clean/Support Zone.

Detailed descriptions of the development and maintenance of these zones are included in Appendix H.

The SHSM and/or PHSM will establish work zones prior to the performance of field operations. The work zones for this project are site-specific and will be established with careful consideration of site conditions (i.e., wind direction, site terrain, gradient).

5.3 SPILL CONTAINMENT

For detailed guidelines regarding spill containment, refer to the most current edition of the U.S. Department of Transportation (DOT) *Emergency Response Guide Book* (DOT P 5800.5), and to the Work Plan (WP) for this project. Potential spill sources during field operations include:

- Hydraulic oil from motor vehicles and drill rigs;
- Decontamination liquids; and
- Contaminated soils.

Containerizing materials as soon as possible will reduce the potential for spills. Handling of waste materials and containers will be in accordance with the WP developed for this report.

If spills occur, the PHSM and SHSM will be notified immediately. The PHSM and SHSM will be responsible for ensuring that necessary notifications are given to the CHSM and the AFCEE representative. The AFCEE representative will inform the station emergency responders if necessary. The AFCEE representative and TEC will determine the strategy for notifying regulatory agencies.

5.4 COMMUNICATION PROCEDURES

To satisfy the training and hazard communication OSHA requirements of 29 CFR 1910.120, field team members shall be provided with a copy of this HSP and shall agree to abide by it by signing the agreement sheet in Appendix K. Field team members agree to inform the PHSM or SHSM of any immediate or potential hazards and take any precautionary measures to ensure proper safety. All preventative measures taken for potential and immediate hazards will be logged in a log book.

The PHSM and/or SHSM shall conduct a health and safety briefing before authorizing individual access to areas where site control is established. The SHSM shall document attendance and the topics discussed, including at least the following:

- Work plan and individual assignments;
- Potential hazards of the work to be performed (Section 3.0 and Appendices O-Q);
- Site controls and air monitoring action levels that will be in effect on site;
- PPE to be used;
- Communication procedures, including evacuation/emergency signals; and
- Emergency response/contingency plan and rescue operations (Section 6.0).

The PHSM and/or SHSM shall conduct daily health and safety tailgate meetings before field team personnel perform fieldwork. A checklist of topics to be covered is in Appendix M. The SHSM shall document attendance and the topics discussed shall include at least the following:

- Any potential hazards of the work to be performed that were not previously discussed;
- Discussion and resolution of any health and safety concerns or problems since the previous tailgate meeting; and
- Evacuation routes and emergency signals warnings.

5.5 PERSONNEL DECONTAMINATION PROCEDURES

Detailed decontamination procedures are contained in Appendix G. Personnel involved in this project may become contaminated in a number of ways, including:

- Contacting vapors, gases, mists, or particulates in the air;

- Being splashed by materials while sampling or opening containers, or during monitoring well installation/development;
- Walking through puddles of liquids or on contaminated soil; and
- Using contaminated instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming contaminated or inhaling contaminants. Good work practices help reduce accumulation of contaminants on protective clothing, field instruments, and equipment.

Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. In removing contaminated clothing, personnel may contact and/or inhale contaminants on the clothing. To prevent such occurrences, methods to reduce contamination will be developed and explained. These procedures and methods will be implemented before anyone enters a site and must continue (and be modified when necessary) throughout this project.

Modified Level D decontamination procedures will be used during this project (Level C procedures will be used if necessary and are detailed in Appendix G). The initial decontamination plan is based on evaluating specific conditions at the site including:

- Type of contaminant;
- Amount of contamination; and
- Levels of protection required (Modified Level D).

A system will be established to dispose or wash and rinse (at least once) all PPE coming in contact with soils or water generated at the site. Wearing disposable boot covers and gloves will eliminate washing and rinsing of both gloves and disposable boots.

Equipment: long-handled soft-bristled brushes, wash tubs or equivalent, pump-activated sprayer, garbage cans with plastic liners and drums with liners, plastic sheeting, paper towels, and duct tape.

Decontamination Solution: detergent; tap water for rinsing.

Decontamination Procedures: two stages of decontamination have been designated.

- *Intermediate:* for periodic exits out of the exclusion zone during sample transport/management.
 - *Steps:* glove wash with detergent, rinse, removal of glove and storage for later use, entering transition zone for sample management, return to exclusion zone wearing new or cleaned gloves.
- *Final:* for use prior to taking breaks/lunch and exiting the site.
 - *Steps:* disposal (if not cleaned to "like new" condition) of gloves in designated receptacles and general field wash for personal hygiene.

At a minimum, the following information must be logged into a field log book to demonstrate that decontamination procedures are performed properly:

- Date;
- Site location;
- Deviations from routine decontamination procedures; and
- Special or unusual conditions or problems.

5.6 EQUIPMENT DECONTAMINATION PROCEDURES

Specified procedures will be used to decontaminate soil and groundwater sampling equipment to prevent cross-contamination of samples. These procedures will conform with AFCEE protocols for sampling equipment decontamination. Decontamination procedures are contained in Appendix G.

All heavy equipment and metal sampling equipment used to collect samples for organics or metals analysis will be decontaminated. Procedures are detailed in the FSP. Heavy equipment that is in direct contact with soil and/or groundwater, such as the hollow stem augers, shall be steam cleaned on site and inspected by the SHSM prior to leaving the site. The decontamination area will be designated by TEC.

Information as described in Section 5.5 will be entered into the field log book to document decontamination procedures.

6.0 EMERGENCY RESPONSE PLAN

The PHSM and/or SHSM will perform the applicable emergency planning tasks before starting field activities and will coordinate emergency response with the facility and local emergency service providers as appropriate. The PHSM and/or SHSM will:

- Evaluate capabilities of local NAS Fort Worth emergency response teams;
- Verify local emergency contacts, evacuation routes, and assembly points;
- Confirm and post emergency telephone numbers and route to hospital;
- Inventory and check site emergency equipment and supplies;
- Establish emergency signals, evacuation routes, and on-site and off-site assembly points;
- Review emergency procedures for personnel injury;
- Review emergency response and post-emergency notification procedures;
- Point out to field team personnel where emergency response equipment is located in the support area; and
- Brief new personnel on the emergency response plan.

In the event that investigation results indicate potential imminent health risk to the public, contracted, or Federal personnel, the Contracting Officer's Representative (COR) and the base Point of Contact (POC) shall be notified via telephone. TEC will provide written notification and supporting documentation within 3 days following the initial notification.

6.1 EMERGENCY PROCEDURES

6.1.1 Adverse Weather or Natural Disasters

The SHSM or designated alternate will remain aware of current weather conditions by monitoring reports and conditions daily and more frequently, if necessary. The SHSM may halt fieldwork if impending or current conditions warrant. If weather conditions require evacuation, the steps detailed in this subsection under the heading "evacuation" will be followed.

Adverse weather conditions in the NAS Fort Worth area may include, but are not limited to:

- Severe thunderstorms;
- Lightning;
- Hail; and
- Tornadoes.

These conditions are seasonal and the SHSM will be aware of when their occurrence is most likely. TEC will have a radio available to routinely monitor weather conditions. Electrical storms within hearing range of the job site will signal termination of work. Work will not continue until the SHSM or their alternate notifies personnel otherwise.

6.1.2 Evacuation

If an evacuation is necessary, the steps below shall be followed.

- Personnel are to leave the work location (upwind) and assemble at a designated assembly point (if safe) upon detecting the emergency signal for evacuation.
- If an emergency situation is of concern to local station personnel, the PHSM or SHSM shall notify the local station contact(s) of the emergency situation.
- If appropriate and safe, the PHSM or SHSM and a "buddy" are to remain at or near the sampling location after the location has been evacuated to assist local responders and advise them of the nature and location of the incident.
- The PHSM, SHSM, or designee is to account for field team members at the assembly point.
- The PHSM and/or SHSM are to complete a Preliminary Incident Report (Appendix N) as soon as possible after the occurrence.

During an emergency, to signal evacuation, a vehicle horn will sound five 3-second blasts; each blast will be separated by 1 second.

A streamlined decontamination procedure is to be used in the event of an evacuation. The SHSM and/or PHSM will ensure that each site worker is aware of and follows evacuation procedures.

6.1.3 Medical Emergencies

If an employee working in a contaminated area is injured or exposed to contaminants, the following steps will be taken:

- Move the employee to a clean area (on a stretcher, if needed);
- Call for the necessary emergency medical response services (ambulance, fire department, hospital, or poison control center) as detailed in the HSP;
- Remove contaminated clothing (if possible);
- Administer first aid, if you are qualified and if the situation warrants it;
- Evacuate other persons threatened by the condition; and
- Arrange transportation to local emergency medical facility.

First aid will be administered only by trained individuals, and only to prevent further injury until professional treatment can be obtained.

The emergency systems detailed in the HSP will be verified prior to the startup of field activities.

The following first aid equipment will be provided at each work site:

- *American National Red Cross First Aid Handbook*;
- First aid kit;
- Portable eyewash unit; and
- Soap or waterless hand cleaner and towels.

6.1.4 Chemical Exposure

The following first aid procedures are to be instituted as soon as possible in response to chemical exposure.

- **Eye Exposure** - If a contaminated solid or liquid gets into the eyes, wash eyes immediately at the emergency eyewash station using large amounts of water and lifting the lower and upper eyelids occasionally. Obtain medical attention immediately.
- **Skin Exposure** - If a contaminated solid or liquid gets on the skin, remove contaminated clothing and wash the contaminated skin promptly using soap or mild detergent and water. Obtain medical attention immediately if there are any symptoms of exposure.
- **Breathing** - If large amounts of a gas or vapor are inhaled, move the person to fresh air at once. If the person cannot breathe, provide artificial respiration. Keep the affected person warm and at rest. Obtain medical attention immediately.
- **Swallowing** - If a contaminated solid or liquid has been swallowed, contact the Poison Control Center shown in Table 6-1, Section 6.3 of this HSP. Obtain medical attention immediately.

6.1.5 Severe Chemical and Physical Injuries

Reducing risks of injury will be a priority; however, field personnel should be aware that the potential exists for severe injuries, to include the following:

- Burns;
- Seizures and fainting;
- Wounds;
- Shock;
- Sprains, strains, and breaks; and
- Spinal cord injury.

Familiarity with the identification of symptoms and treatment of these and other severe injuries is paramount in successful treatment. An *American Red Cross Standard First Aid* handbook will be available on site for personnel review at all times.

6.1.6 Explosion And Fires

In the event of an explosion or fire at the site, the SHSM will take the following actions at a minimum.

- Evacuate all unnecessary personnel to the prearranged assembly point (if safe).
- Request emergency response assistance from the fire department, hospitals, and poison control centers.
- Notify the PHSM of the incident.

6.2 EMERGENCY EQUIPMENT

The following emergency equipment and supplies will be kept on site during drilling and monitoring well installation:

- ABC fire extinguisher (or equivalent);
- First aid kit;
- Rubber gloves (latex or other); and
- Portable eyewash.

7.0 REFERENCES

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APPENDIX A
LEVELS OF PROTECTION

APPENDIX A LEVELS OF PROTECTION

Note: The following Appendix is based on the *Standard Operating Safety Guidelines*, USEPA, Environmental Response Branch, Hazardous Response Support Division, Office of Emergency and Remedial Response, November, 1984.

INTRODUCTION

Wear personnel protective equipment (PPE) when response activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated by site activities; or when direct contact with skin-affecting substances may occur. Full face-piece respirators protect the lungs, gastrointestinal tract, and eyes against airborne toxins. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene can limit or prevent ingestion of material.

Equipment to protect the body against contact with known or anticipated toxic chemicals has been divided into four categories according to the degree of protection afforded.

- Level A: Should be worn when hazardous substances have been identified and requires the highest level of protection for skin, eyes, and the respiratory system. Level A protective measures are implemented when there are measured or potentially high concentrations of atmospheric vapors, gases, or particulates; or site operations and work functions involve a high potential for splash, immersion; or exposure to unexpected vapors, gases, or particulates that are harmful to the skin or capable of being absorbed through the skin; or substances with a high degree of hazard to the skin are known or suspected to be present and skin contact is possible.
- Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. The atmosphere contains less than 19.5 percent oxygen or greater than 23.5 percent oxygen.
- Level C: Should be worn when atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin. The type(s) of air contaminants have been identified, concentrations measured, and air-purifying respirators are available that can remove contaminants.
- Level D: Should be worn only as a work uniform and not on any site with respiratory or skin hazards. It provides minimal protection against chemical hazards.

NOTE: Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task.

The Level of Protection selected should be based on the following criteria.

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to type of work.
- Knowledge of chemicals disposed along with properties such as toxicity and route of exposure.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better identified.

Wearing PPE reduces the potential for contact with toxic substances, ensuring the health and safety of responders. In addition, safe work practices requires decontamination, site entry protocols, and other safety procedures. Together, PPE and safe work practices provide an integrated approach for reducing potential harm to workers.

There are four basic levels of PPE: A, B, C, and D. Levels B, C, and D are described below. Level A will not be required on-site.

The equipment listed is considered generic. The actual selection of equipment is based on need.

LEVEL B PROTECTION

Personnel Protective Equipment

Level B Personnel Protective Equipment includes:

- Supplied-air respirator (MSHA/NIOSH approved). Respirators may be positive pressure-demand, SCBA or positive pressure-demand, airline respirator (with escape bottle for IDLH or potential for IDLH atmosphere).
- Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one or two-piece chemical-splash suit; disposable chemical-resistant, one-piece suits).
- Long cotton underwear.
- Coveralls.
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.

- Boots (outer), chemical-resistant, steel toe and shank.
- Boot covers (outer), chemical-resistant (disposable).
- Hard hat (face shield).
- 2-Way radio communications (intrinsically safe).

Criteria For Selection

Level B Protection is needed if any one of these criteria is met:

- The type and atmospheric concentration of toxic substances has been identified and requires a high level of respiratory protection, but less skin protection than Level A. These would be atmospheres with IDLH concentrations, but substance or concentration in the air does not represent a severe skin hazard, or that do not meet the selection criteria permitting the use of air-purifying respirators.
- The atmosphere contains less than 19.5 percent oxygen or greater than 23.5 percent oxygen.
- It is highly unlikely that the work being done will generate high concentrations of vapors, gases, or particulates; or splashes of material that will affect the skin of personnel wearing Level B protection.
- Atmospheric concentrations of unidentified vapors or gases are indicated by direct readings on instruments such as the FID or PID or similar instruments, but vapors and gases are not suspected of containing high levels of chemicals toxic to the skin.

Guidance On Selection

Level B does not afford the maximum skin protection as does a fully encapsulating Level A suit because Level B chemical-resistant clothing is not considered gas-, vapor-, or particulate-tight; however, a good quality, hooded, chemical-resistant, one-piece garment with taped wrists, ankles, and hood provides a reasonable degree of protection against splashes and to lower concentrations of contaminants in the air. At most hazardous waste sites, ambient atmospheric gas or vapor levels have not approached concentrations that are sufficiently high to warrant Level A protection. In all but a few circumstances (where highly toxic materials are suspected) Level B should provide the protection needed for initial entry. Subsequent operations at a site require a re-evaluation of Level B protection based on the probability of being splashed by chemicals, their effect on the skin, the presence of hard-to-detect air contaminants, or the generation of highly toxic gases, vapors, or particulates, due to the work being done.

The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail, and permeability. One- or two-piece garments are available with or without hoods. Disposal suits with a variety of fabrics and design characteristics are also available. Taping joints between the gloves, boots, and suit, and between the hood and respirator reduces the possibility for splash and vapor or gas penetration. These factors and other selection criteria all affect the degree of protection afforded; therefore, a specialist should select the most effective chemical-resistant clothing based on known or anticipated hazards and job function.

Level B equipment provides a high level of protection to the respiratory tract. Generally, if a SCBA is required for respiratory protection, selecting chemical-resistant clothing (Level B) rather than a fully encapsulating suit (Level A) is based on needing less protection against known or anticipated substances affecting the skin. Level B skin protection is selected based on the following criteria.

- Comparing the concentrations of known or identified substances in air with skin toxicity data.
- Determining the presence of substances that are destructive to or readily absorbed through the skin by liquid splashes, unexpected high levels of gases, vapor, or particulates, or other means of direct contact.
- Assessing the effect of the substance (at its measured air concentrations or potential for splashing) on the small areas left unprotected by chemical-resistant clothing. A hooded garment taped to the mask, and boots and gloves taped to the suit further reduces area of exposure.

For initial site entry and reconnaissance at an open site, approaching whenever possible from upwind, Level B protection (with good quality, hooded, chemical-resistant clothing) should protect response personnel, provided that conditions described in selecting Level A are known or judged to be absent.

LEVEL C PROTECTION

Personnel Protective Equipment

Level C Personnel Protective Equipment includes:

- Air-purifying respirator, full-face, cartridge-equipped (MSHA/NIOSH approved).
- Chemical-resistant clothing (coveralls; hooded, one-piece or two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls).
- Coveralls.
- Long cotton underwear.
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.
- Boots (outer), chemical-resistant, steel toe and shank.
- Boot covers (outer), chemical-resistant (disposable).
- Hard hat (face shield).
- Escape mask.
- 2-Way radio communications (intrinsically safe).

Criteria For Selection

Level C Protection is needed if all of these criteria are met:

- Oxygen concentrations are less than 19.5 percent by volume.
- Measured air concentrations of identified substances will be reduced by the respirator below the substance's threshold level value (TLV) or permissible exposure limit (PEL) and the concentration is within the service limit of the cartridge.
- Atmospheric contaminant concentrations do not exceed IDLH levels.
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.
- Job functions do not require a SCBA.
- Continuous direct readings between 5 and 50 ppm above background in an unknown environment on instruments such as the FID or PID.

Guidance On Selection

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing air-purifying respirators.

The air-purifying device is generally a full-face respirator (MSHA/NIOSH approved) equipped with the appropriate cartridge. Cartridges must be able to remove the substances encountered. Quarter- or half-masks should be used only with the approval of the Site Health and Safety Manager (SHSM). In addition, a full-face, air-purifying mask can be used only if:

- Substance has adequate warning properties,
- Individual passes a qualitative fit-test for the mask, and
- Appropriate cartridge is used, and its service limit concentration is not exceeded.

An air surveillance program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be thoroughly monitored when personnel are wearing air-purifying respirators. Periodic surveillance using direct-reading instruments and air sampling is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

Level C protection with a full-face, air-purifying respirator should be worn routinely in an atmosphere only after the type of air contaminant is identified, concentrations measured, and the criteria for wearing air-purifying respirator met. To permit flexibility in prescribing a Level of Protection at certain environmental incidents, a specialist could consider using air-purifying respirators in unidentified vapor/gas concentrations of a few ppm above background as indicated by a needle deflection on the FID or PID. However a needle deflection of a few ppm above background should not be the

sole criterion for selecting Level C. Because the individual components may never be completely identified, a decision on continuously wearing Level C must be made after assessing all safety considerations, including:

- The presence of (or potential for) organic or inorganic vapor/gases against which a cartridge is ineffective or has a short service life.
- The known (or suspected) presence in air of substances with low TLVs or IDLH levels.
- The presence of particulates in air.
- The errors associated with both the instruments and monitoring procedures.
- The presence of (or potential for) substances in air which do not elicit a response on the instrument used.
- The potential for higher concentrations in the ambient atmosphere or in the air adjacent to specific site operations.

The continuous use of air-purifying respirators (Level C) must be based on identifying substances contributing to total vapor or gas concentration and applying published criteria for the routine use of air-purifying devices. Unidentified ambient concentrations of organic vapors or gases in air approaching or exceeding 50 parts per million (ppm) above background require, as a minimum, Level B protection.

LEVEL D PROTECTION

Personnel Protective Equipment

Level D PPE includes:

- Coveralls.
- Gloves.
- Boots/shoes, leather or chemical-resistant, steel toe and shank.
- Safety glasses.
- Hard hat.

Criteria For Selection

Level D Protection is warranted if any of these criteria are met:

- No contaminants are present, or contaminants are present below levels where there is evidence of adverse health effects, such as below the TLV or PEL.
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

PROTECTION IN UNKNOWN ENVIRONMENTS

For all incident responses, selecting the appropriate PPE is one of the first steps in reducing health effects from toxic substances. Until the toxic hazards at an environmental incident can be identified, and personnel safety measures commensurate

with the hazards instituted, preliminary measures will have to be based on experience, judgment, and professional knowledge. One of the first concerns in evaluating an unknown situation is atmospheric hazards. Toxic concentrations (or potential concentrations) of vapors, gases, and particulates; low oxygen content explosive potential and, to a lesser degree, the possibility of radiation exposure all represent immediate atmospheric hazards. In addition to making air measurements to determine these hazards, visual observation and review of existing data can help determine the potential risks from other materials.

Once immediate hazards, other than toxic substances, have been eliminated, the initial on-site survey and reconnaissance, which may consist of more than one entry, continues. The purpose of the on-site survey is to further characterize toxic hazards and, based on these findings, refine preliminary safety requirements. As data are obtained from the initial survey, the Level of Protection and other safety procedures are adjusted. Initial data also provide information on which to base further monitoring and sampling. No one method can determine a Level of Protection in all unknown environments. Each situation must be examined individually.

ADDITIONAL CONSIDERATIONS FOR SELECTING LEVELS OF PROTECTION

Other factors which should be considered in selecting the appropriate Level of Protection are described below.

Heat and Physical Stress

The use of protective clothing and respirators increases physical stress, particularly heat stress, on the wearer. Chemical protective clothing greatly reduces body ventilation and diminishes the body's ability to regulate its temperature. Even in moderate ambient temperatures, the diminished capacity of the body to dissipate heat can result in one or more heat-related problems.

All chemical protective garments can cause heat stress. Somewhat less stress is associated with Level B or C Protection when the specified clothing does not require the use of a hood (tightly fitted against the respirator face piece) and taped gloves, boots, and suit, because more body ventilation and evaporation can occur. As more body area is covered, the probability of heat stress increases. Whenever any chemical-protective clothing is worn, a heat stress recovery monitoring program must occur.

Wearing protective equipment also increases the risk of accidents. It is heavy, cumbersome, decreases dexterity and agility, interferes with vision, and is fatiguing to wear. These factors all increase physical stress and the potential of accidents. In particular, the necessity for selecting Level A protection should be balanced against the increased probability of physical stress and accidents. Level B and C protection somewhat reduces accident probability because the equipment is lighter, less cumbersome, and vision problems are less serious.

Air Surveillance

A program must be established for routine, periodic air surveillance. Without an air surveillance program, any changes could go undetected and jeopardize response personnel. Surveillance can be accomplished with various types of air pumps and filtering devices followed by analysis of the filtering media; portable real-time monitoring instruments located strategically on site; personal dosimeters; and periodic walk-throughs by personnel carrying direct-reading instruments.

Decision Logic for Selecting Protective Clothing

No adequate criteria, similar to the respiratory protection decision-logic, are available for selecting protective clothing. A concentration of a known substance in the air approaching a TLV or permissible exposure limit does not automatically warrant a fully encapsulating suit. A hooded, high quality, chemical-resistant suit may provide adequate protection. The selection of Level A over Level B Protection is a judgment that should be made by a qualified individual considering the following factors.

- *The physical form of the potential contaminant.* Airborne substances are more likely for body contact with personnel wearing non-encapsulating suits because they are not gas- or vapor-tight.
- *Effect of the material on skin.* Highly hazardous substances are easily absorbed through the skin creating systemic effects, or causing severe skin destruction. Skin contact with liquids is generally more hazardous than vapors, gases, and particulates. Less hazardous substances are not easily absorbed through the skin creating systemic effects, or causing severe skin destruction.
- *Concentration of the material.* The higher the concentration, the higher the risk of harm.
- *The potential for contact.* Exposure to the material due to work function and the probability of direct exposure to the small area of skin unprotected by Level B or C chemical-resistant clothing is an important consideration.

Atmospheric Conditions

Atmospheric conditions such as temperature, wind direction, wind velocity, and barometric pressure determine the behavior of contaminants in air or the potential for volatile material getting into the air. These parameters should be considered in determining the need for and the appropriate Level of Protection required.

Work in Exclusion Zone (EZ)

For operations in the EZ (area of potential contamination), different Levels of Protection may be selected, and various types of chemical-resistant clothing may be worn. This selection would be based not only on measured air concentrations, but also on the job function, reason for being in the area, the potential for skin contact or inhalation of the materials present, and ability to decontaminate the protective equipment used.

Escape Masks

The use of escape masks is an option in Level C protection. A specialist should determine their use on a case-by-case basis. Escape masks could also be strategically located on site in areas that have higher possibilities for harmful exposure.

Vapor or Gas Concentrations as Indicated by Direct-Reading Instruments

Instruments such as the FID and PID can be used to detect the presence of many organic vapors or gases either as single compounds or mixtures. Dial readings are frequently referred to, especially with unidentified substances, as total vapor and gas concentrations (in ppm). More correctly, they are deflections of the needle on the dial indicating an instrument response and do not directly relate to total concentration in the air without using response factors. **In addition, when setting action levels based on total vapor readings, the instrument's sensitivity or span must be specified.** As a guide to selecting Level of Protection in an unknown environment, based on dial readings only, the following values could be used. They should not be the sole criteria for selecting Levels of Protection. For example, if the substances are known, the TLV, or PEL, is used.

<i>Dial Reading</i>	<i>Level of Protection</i>
Up to 10 ppm above background	D
10-50 ppm above background (no benzene)	C
>50 ppm above background	B

Vapor or gas concentration, as indicated by the readout on instruments such as the FIDs or PIDs, are a useful adjunct to professional judgment in selecting the Level of Protection to be worn in an unknown environment. It should not be the single selection criterion, but should be considered with all other available information. Total vapor or gas concentration as selection criteria for Levels of Protection should only be used by qualified, experienced persons.

UPGRADING/DOWNGRADING LEVEL OF PROTECTION

The level of protection shall be upgraded or downgraded upon direction of the SHSM.

Reasons to upgrade level of protection include the following criteria:

- Odors or direct readings on a PID, FID, or other instrument that indicates the presence of increased levels of chemicals.
- Request of individual performing task.
- Occurrence, or likely occurrence, of gas or vapor emission.
- Change in task that will increase contact or potential contact with hazardous materials.

- Increased dermal-respiratory hazards.
- Presence of chemical contaminants above an established action level as indicated by direct-reading instruments or odors.

Reasons to downgrade level of protection include:

- New information indicating that the situation is less hazardous than was originally thought.
- Change in conditions that decreases the hazard.
- Change in task that will reduce contact with hazardous materials.

APPENDIX B
SAFETY TRAINING

APPENDIX B SAFETY TRAINING

This section provides a brief description of the The Environmental Company, Inc. (TEC) hazardous waste health and safety training program. Consistent with Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1919.120), no individual will engage in hazardous waste field activities until they have been trained to conduct those activities commensurate with the degree of anticipated hazards. All TEC personnel participating in this project will have received the following health and safety training:

- OSHA health and safety training;
- standard first aid; and
- standard adult CPR.

The TEC health and safety training program provides various levels of training depending on the hazard(s) at a specific site. Basic training provides, at a minimum, an understanding of:

- the SOPs to be followed at hazardous waste sites;
- the potential hazards which may be encountered at hazardous waste sites, and potential consequences of exposure to those hazards;
- the procedures to effectively deal with hazards to minimize the risk of adverse impact on the health and safety of employees, subcontractors, and third parties; and
- the purpose and limitations of safety equipment.

Health and safety training (along with Medical Clearance and Respirator Clearance), is a requirement to obtain Site/Activity Clearance. Respirators will be used only by authorized personnel who are properly trained and fit tested for the specific respirator. A complete description of the requirements of the Respirator Clearance program is included in the TEC Health and Safety Policy Manual.

The following is a representative outline of a 40-hour training course taken by TEC personnel:

- Overview of Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Superfund Amendments Reauthorization Act (SARA), Resource Conservation and Recovery Act (RCRA), and OSHA regulations;
- Physical/Chemical Hazard Recognition;
- Levels of Protection;
- Personnel Exposure Guidelines;
- Sources of Information;
- Hazard Recognition/Evaluation (Problem);
- Monitoring Instruments (Workshop);
- Heat/Cold Stress;
- Protective Clothing;

- Respiratory Protection: Introduction and Use (Exercise);
- HSPs (Exercise);
- Field Operations (Problem);
- Personnel Decontamination (Demonstration);
- Field Operations (Exercise); and
- Certification Examination.

OSHA regulations require 8 hours of refresher training on an annual basis. TEC personnel participating in this project must complete refresher training annually.

The most relevant training for hazardous waste work is on-the-job training (OJT). This is a system whereby less experienced field personnel participate in actual field activities under the direction of more experienced personnel. Twenty-four hours of OJT under the direction of a trained supervisor as part of pre-assignment health and safety training is required by OSHA. OJT is a requirement to qualify for supervisory training.

Additionally, OSHA regulations require that 8 hours of hazardous waste site management training be provided to hazardous waste site supervisors, (i.e., to the Site Health and Safety Manager (SHSM) and Project Health and Safety Manager (PHSM)). Health and Safety Managers (HSMs) for this project will be trained in compliance with applicable OSHA regulations.

No TEC employee will participate in this project unless he/she has been trained in the provisions of the TEC Health and Safety Policy Manual and has practiced job assignments in non-hazardous situations.

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APPENDIX C
MEDICAL MONITORING PROGRAM

APPENDIX C

MEDICAL MONITORING PROGRAM

Sections 4.0 and 5.0 of the The Environmental Company, Inc. (TEC) Health and Safety Policy Manual (TEC, 1992) describe the TEC Corporate Medical Monitoring Program. Strict compliance with the specified administrative and medical procedures and protocols is mandatory.

Medical monitoring is an integral component of occupational health and safety programs. The intent of the Medical Monitoring Program is to monitor the health of individual project personnel through the use of initial and periodic medical examinations and diagnostic testing.

This program allows the occupational physicians to:

- certify individuals to work on hazardous waste projects as required by Occupational Safety and Health Administration (OSHA) regulations;
- establish a baseline for evaluating any future changes in health or physical well being;
- identify any underlying illnesses or conditions which might be aggravated by certain exposures or job activities; and
- recognize any abnormalities, toxic reactions, or other changes at the earliest opportunity so that corrective measures may be taken.

The Project Health and Safety Manager (PHSM) or Site Health and Safety Manager (SHSM) will authorize individuals to access areas where site control is established to conduct fieldwork in accordance with this Health and Safety Plan (HSP) only if current certification of medical fitness, training, and respirator fit are in accordance with OSHA regulations. Copies of certifications will be on file.

Employees of subcontractors will provide documentation of their participation in a medical surveillance program before the start of fieldwork. Documentation will be maintained in the project file.

Before being assigned to a hazardous or potentially hazardous activity involving exposure to toxic materials, each TEC employee will receive a pre-assignment or baseline physical examination, as suggested by the National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard/ U. S. Environmental Protection Agency (USEPA) *Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities* (U.S. Department of Health and Human Services, 1985).

The minimum medical monitoring requirements for TEC personnel at the Carswell WSA are as follows:

- complete medical and work histories;
- physical examination;
- pulmonary function test, forced vital capacity and forced expiratory volume;
- eye examination and visual acuity;

- audiometry;
- urinalysis; and
- blood chemistry, including hematology and serum analyses.

The pre-assignment physical examination categorizes employees as fit for duty and able to wear respiratory protection. In addition to the baseline physical examination, all employees will obtain an annual physical exam. Although drug and alcohol screening are not part of the TEC Medical Monitoring Program, the TEC Employee Handbook specifically addresses drug and alcohol use. The unlawful manufacture, possession, distribution, transfer, purchase, sale, use, or being under the influence of alcoholic beverages or illegal drugs while on site, while attending business-related activities, while on duty, or while operating a vehicle or machine leased or owned by TEC is strictly prohibited and may lead to disciplinary action, including suspension without pay or discharge. When appropriate, TEC may refer the employee to approved counseling or rehabilitation programs. TEC will request documentation from project subcontractors of their existing drug and alcohol screening policies.

All personnel working in contaminated or potentially contaminated areas at the Carswell WSA will have current medical monitoring (within 12 months). TEC will maintain documentation for TEC personnel on file specifying that all employees are fit for duty. Each certificate will be signed by an attending physician.

APPENDIX D

PHYSICAL SAFETY HAZARD PROCEDURES

APPENDIX D

PHYSICAL SAFETY HAZARD PROCEDURES

Possible physical hazards associated with field activities at the site may include any of the hazards discussed below. The controls specified shall be implemented during site operations. For additional information, refer to The Environmental Company, Inc. (TEC) Health and Safety Policy Manual for Hazardous Waste Projects (TEC, 1992).

NOISE

The main sources of noise for this project are drill rigs. Hearing protection must be worn in areas where noise levels are at the permissible exposure limit (PEL) of 85 decibels or greater. Hearing protection is required when, at 3 feet apart in normal conversation, voices must be raised to be heard. A Type II sound level meter should be used to measure site noise to verify sound levels and determine the need for hearing protection. Hearing protection should be specified by the Project Health and Safety Manager (PHSM) or Site Health and Safety Manager (SHSM) based on measured levels at the site.

PRECARIOUSLY POSITIONED OBJECTS

Field personnel shall become familiar with the general area and the potential physical hazards associated with debris or objects (e.g., drums, boards) that may be piled or scattered around the sites. If objects are stacked in an unsafe manner, the PHSM shall notify the client site contact. Field activities shall not begin until Base personnel remove or safely restack the objects.

WALKING AND WORKING IN OPEN TERRAIN

Field personnel shall become familiar with the general terrain of the site and potential physical hazards (uneven terrain, etc.) that would be associated with accidental slips, trips, and/or falls.

LIFTING

Field personnel should use their own judgment in determining loads that they can safely lift. When possible, loads should be lifted with two hands, without trunk rotation, and using leg muscles (not back muscles) for elevation. Loads should also be lifted so that the center of mass is stable during the initiation and duration of the lift. Floor surfaces should be in good condition (e.g., clear of obstacles, level, dry). Workers and supervisors should also increase rest duration and frequency if necessary to reduce injury potential.

Repetitive lifting increases potential of injury. Ambient temperature should also be considered if lifting requires repetitive motion. *The Applications Manual For The Revised Lifting Equation* (NIOSH, 1994) contains more detailed information regarding repetitive lifting and required recovery periods. If frequent repetitive lifting is anticipated, the NIOSH manual is recommended to estimate the hazard to workers in order to reduce potential injuries.

As mentioned earlier, field personnel should use their own judgment when lifting heavy objects as dexterity and muscle conditioning may vary greatly by individual. The following recommendations should be considered when lifting a heavy load:

- bring the load closer to the body;
- remove any horizontal barriers;
- reduce the size of the load;
- avoid lifts near the floor;
- if loads near the floor cannot be avoided, the load should fit easily between the legs;
- raise/lower the origin/destination of the lift;
- reduce trunk rotation by rotating the feet;
- reduce the lifting frequency and duration;
- provide longer recovery periods;
- provide new containers with adequate handles; and
- eliminate the need for lifting by redesigning or modifying the container characteristics.

TAGGING OF DEFECTIVE TOOLS, MATERIALS, OR EQUIPMENT

Defective tools, materials, or equipment that could impact personnel safety or the environment shall not be used. When a defective tool, material, or piece of equipment is found, the PHSM shall take it out of service immediately by tagging, destroying, or removing it from the project. Danger tags shall be dated, sequentially numbered, and signed by the supervisor. A defective equipment log shall be maintained.

HOUSEKEEPING

Poor housekeeping is a sign of a poorly managed project and is the root of many safety problems. All material, scrap, tools, toolboxes, and other equipment shall be stored in a neat and orderly fashion. Trash and scrap shall be removed from the work area on a regular basis (i.e., at least daily before the end of each work shift) and shall never be allowed to accumulate.

Housekeeping will receive a major emphasis during daily and weekly inspections. If housekeeping has become a problem, the PHSM or SHSM reserves the right to stop work and require a cleanup before work resumes.

SLIP, TRIP, AND FALL HAZARDS

Falls as a result of slipping or tripping are the most common form of injury on construction sites. These injuries are a result of poor housekeeping, lack of attention to detail, or carelessness.

Slipping hazards such as grease, oil, water, ice, snow, or other liquids shall be cleaned up or eliminated on accessways or working areas. If slipping hazards cannot be eliminated completely, the area shall be barricaded and posted with applicable hazard postings.

The job site, especially roadways, accessways, and ladders shall be kept clean and clear of hoses, extension cords, welding leads, and other obstructions that may cause tripping or other accident hazards. If tripping hazards cannot be eliminated completely, the area shall be barricaded and posted with applicable hazard postings.

FIRE PROTECTION AND PREVENTION

All necessary and appropriate precautions to prevent fires will be taken. Sufficient water and fire fighting equipment shall be available at all times to control fires as specified below. All heavy equipment must be equipped with 5-pound dry chemical fire extinguishers rated ABC. A 10-pound dry chemical fire extinguisher rated ABC must be located in all trailers per The National Fire Protection Association (NFPA) 10 Standard. A 20-pound fire extinguisher rated ABC must be provided within 50 feet, but no closer than 25 feet, to all fueling operations and flammable storage areas.

Open burning of trash and debris shall not be permitted. If there is a danger of accidental fire, e.g., during cutting or welding operations, a person shall be designated as fire watch and shall be dedicated solely to this effort during that operation and shall continue this duty for 30 minutes after the operation is completed.

Flammable or combustible liquid storage shall comply with NFPA 30 and OSHA 1926.152. All fuel cans, such as 5-gallon gas cans, shall be free of deformities and constructed of metal, with self-closing lids and flame arresters. Fuel cans shall be labeled with their contents. All equipment shall be fueled through funnels or spouts to prevent spills.

MATERIAL HANDLING AND STORAGE

All new material shall be stored on dunnage. All material shall be stored and secured as necessary to prevent blowing, falling, sliding, or collapsing. Debris and scrap material need not be stored on dunnage if the material will not be moved with rigging and can be maintained in a stable manner. TEC and all subcontractors shall ensure that material is stored properly to prevent scattering or lost equipment.

No material, tools, or equipment shall be leaned against other objects or walls unless they are secured. Employees moving material by hand shall use proper lifting techniques and gloves. Safe working load limits shall be labeled on all temporary elevated floors or platforms, and these limits shall not be exceeded.

TOOLS

All tools shall be kept in good condition and properly stored. Tools shall not be altered, and they shall be used only for their intended purposes. Guards shall not be removed from tools, and all nip points, open drums, and fly wheels shall be guarded. All tools shall be inspected by the user before use, with special attention to power cords and the condition of teeth. If a power cord has been repaired more than once, the tool shall be tagged defective, and not used until a new power cord is installed.

Power tools shall be equipped with constant pressure switches that will shut the tool off when the switch is released. All power tools and electrical equipment shall be double insulated or be equipped with ground plugs.

ELECTRICAL

Ordinary 120 volt (V) alternating current (AC) may be fatal. Extensive studies have shown that currents as low as 10 to 15 milliamperes (mA) can cause loss of muscle control and that 12 V AC may, on good contact, cause injury. Therefore, all voltages should be considered dangerous. All electrical equipment and power lines should be treated cautiously by trained personnel.

Extra precautions will be taken when drilling near overhead electrical lines. The minimum clearance between overhead electrical lines of 50 kilovolts (kV) or less and the drill rig is 10 feet. For lines rated over 50 kV, the minimum clearance between the lines and any part of the rig is 10 feet plus 0.4 inches for each kV over 50 kV. Drilling operations must cease during thunderstorms. If necessary, TEC may request NAS Fort Worth personnel to wrap overhead utility lines prior to initiating drilling operations.

The SHSM will provide on-site surveillance of the drilling subcontractor to ensure that personnel meet these requirements. If deficiencies are noted, work will be stopped and corrective actions implemented. Reports of health and safety deficiencies and the corrective actions taken will be forwarded to the installation manager by the SHSM.

Work on energized circuits will not be permitted at the site.

Ground fault circuit interrupters (GFCIs) will be required at all times. Lighting must be hooked up to a GFCI unless the electrical connections are different from all other electrical hookups and cannot be mistakenly exchanged.

Electrical panels, boxes, etc., with open knockouts through which no service has been installed must be covered. Electrical cords and equipment shall not be hung or tied to steel or hung with wire unless a non-conductive material is used to insulate the cord from the metal. Plastic-coated wire shall not be used to hang electrical cords. All lights must be equipped with protective, non-conductive covers, and all light bulbs in light stringers must be shatterproof. Cords that pass through doorways or holes or are exposed to vehicle traffic shall be protected from damage. Flexible electrical cords shall not be spliced or have insulation repaired with tape. Only SO-type cords or equivalent shall be used for light stringers.

All breaker boxes, electrical receptacles, and feed lines shall be labeled to identify the "from" and "to" circuits. All breaker boxes and disconnects shall be provided with unobstructed access 36 inches in front of the unit. All 480-volt lines shall be labeled clearly. When passing over or through walkways, electrical cords shall be strung at least 7 feet above the walking surface. The subcontractor shall comply with codes in the current NFPA and National Electric Codes (NEC).

LADDERS

All ladders shall be inspected before use and stored on dunnage or ladder racks. Tools and material shall not be left on top platforms of unattended ladders, and material shall never be stored on ladders. All ladders shall be labeled with legible manufacturer instructions and warning labels. Ladders shall not be painted except for identification marks.

All ladders shall be type 1A and shall be wooden or have fiberglass siderails with metal rungs. The bases and landings of all ladders shall be kept clear of obstacles. Stepladders shall not be used as straight ladders, and extension ladders shall not be separated for use. All ladders shall be equipped with skid-resistant feet. If a ladder is used in a doorway, the doorway must be barricaded. Ladders shall not be used in lieu of elevated work platforms.

Employees shall never carry material when climbing ladders, nor shall tools or equipment be thrown to or from personnel on ladders. Hand-lines shall always be used to hoist material. Personnel shall not climb to the top step or top platform of any ladder. When in use, ladders shall be held or secured by tying off. Personnel working on ladders shall not straddle the ladder or overreach so that the body is no longer between the siderails.

Job-built ladders shall be inspected by a competent person and shall meet the OSHA standard. In addition, all job-built ladders shall have a furring strip attached over the filler block and rung.

MOTOR VEHICLES AND HEAVY EQUIPMENT

Drivers and/or operators of vehicles and heavy equipment must have the appropriate state license certifying their qualifications to drive or operate each piece of equipment or vehicle. When state certification is not available for a piece of heavy equipment, the subcontractor shall submit to the PHSM a certificate of operator qualification for each operator, listing each piece of heavy equipment that the operator is qualified to operate.

Drivers shall be responsible for the safety of all passengers and the stability of materials being hauled. Personnel shall not mount or dismount moving vehicles. Personnel shall not ride in the bed of any vehicle. Every passenger in a motor vehicle shall have a safe place to ride. The use of seat belts shall be mandatory when operating or riding in vehicles.

Unattended vehicles and heavy equipment shall not be left running. If the operator is to get out of or off of the equipment, it must be shut down properly.

All blades and buckets shall be lowered when the operator leaves the cab unless physically locked or properly blocked.

Heavy equipment shall be maintained in proper operating condition at all times. All machines shall be equipped with roll-over protective structure (ROPS) cabs. Operators shall be trained in the proper method of working on slopes.

All heavy equipment with ROPS cabs shall be labeled as required by 29 CFR 1926.1000. Seat belts shall be installed and used in all equipment with ROPS attachments except for compactors and rubber-tired skid steer equipment. All heavy equipment shall be equipped with functioning back-up alarm systems that are clearly audible above surrounding noise.

All equipment and tools shall be subject to an inspection, conducted by the PHSM, upon arrival at the site and prior to being placed into service. Operators shall perform daily inspections of machinery and equipment. Records of these inspections shall be made and kept by the subcontractor. These records shall be available to the PHSM upon request. Defective equipment that could endanger personnel or the environment shall be tagged defective, and repaired immediately or removed from service. All machinery shall be subject to inspection by the PHSM. Owners' manuals shall be made readily available upon request.

Oils or other fluids (except water) that leak onto the ground shall be cleaned up by the subcontractor, and the contaminated soil shall be disposed of in accordance with the Work Plan (WP).

All equipment is designed for a particular function and shall be operated according to the manufacturer's recommendations and within the manufacturer's limitations. For lifting operations with equipment other than cranes, prior written approval must be obtained from the PHSM.

TRAFFIC CONTROL

The subcontractor shall be responsible for orderly traffic control on the job site. All traffic control measures on public roadways shall be in accordance with Transportation Department regulations for use of flagmen, construction barriers, and appropriate distance requirements. The subcontractor shall provide traffic signs and/or signalmen where and when necessary to protect personnel and/or the general public.

APPENDIX E

HEAT STRESS SYMPTOMS AND TREATMENT

APPENDIX E

HEAT STRESS SYMPTOMS AND TREATMENT

HEAT STRESS

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety; and, decreased concentration, dexterity, or movement) to death. Because heat stress is one of the most common and potentially serious illnesses at hazardous waste sites, regular monitoring and other preventative measures are vital.

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of heat regulating mechanisms of the body—the individual's temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

Symptoms: Red, hot, dry skin; absence of perspiration (although the person may have been sweating earlier); nausea; dizziness; confusion; extremely high body temperature, rapid respiratory and pulse rate; unconsciousness or coma.

Treatment: Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death will result. Soak victim in cool but not cold water; if the water is too cold, shock may be induced. Sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (102 °F). Observe the victim and obtain medical help. Do not give coffee, tea, or alcoholic beverages.

Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is much less dangerous than heat stroke, but it nonetheless must be treated.

Symptoms: Pale, clammy, moist skin, profuse perspiration and extreme weakness. Body temperature is normal, pulse is weak and rapid, breathing is shallow. The person may have a headache, may vomit, and may be dizzy.

Treatment: Remove the person to a cool, air-conditioned place, loosen clothing, place in a head-low position, and provide bed rest. Monitor for shock. Consult physician, especially in severe cases. The normal thirst mechanism is not sensitive enough to ensure body fluid replacement. Have patient drink 1-2 cups of water immediately, and every 20-minutes thereafter, until symptoms subside. Total water consumption should be about 1-2 gallons per day.

Heat cramps are caused by perspiration that is not balanced by adequate fluid intake. They are often the first sign of a condition that can lead to heat stroke.

Symptoms: Acute painful spasms of voluntary muscles, (e.g., abdomen and extremities).

Treatment: Remove victim to a cool area and loosen clothing. Have patient drink 1-2 cups of water or, if available, electrolyte replacements (Gatorade, Crystal Light, or Squincher) immediately, and every 20 minutes thereafter, until

symptoms subside. Apply direct pressure to affected areas to help ease cramping. Total water consumption should be 1-2 gallons per day. Consult with physician.

Heat rash is caused by continuous exposure to heat and humid air, and aggravated by chafing clothes. The condition decreases the body's ability to tolerate heat.

Symptoms: Mild red rash, especially in areas of the body in contact with protective gear.

Treatment: Decrease amount of time in protective gear. After decontamination, wash skin and allow to dry thoroughly. Apply powder to help absorb moisture and decrease chafing, unless the skin is broken.

For strenuous field activities that are part of on-going site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat, and to manage the work cycle.

These procedures are to be instituted when the temperature exceeds 70 °F:

- The site health and safety manager or field manager will monitor and control heat stress;
- A work/rest schedule, developed in coordination with subcontractor supervisors, will be implemented dependent on work levels, PPE, and climatic conditions (general guidelines for heavy work at high temperatures in protective clothing include rest breaks in the shade at least 10 minutes out of every hour);
- Plenty of liquids for fluid replacement will be available;
- The site health and safety manager or field manager will monitor workers who are using protective clothing at elevated temperatures by closely observing site workers and measuring heart rate if any symptoms of heat stress are observed; and
- If heart rates exceed 110 beats per minute during or at the beginning of rest periods, the next work period will be shortened by 10 minutes.

APPENDIX F

BIOLOGICAL AND CHEMICAL HAZARD PROCEDURES

APPENDIX F

BIOLOGICAL AND CHEMICAL HAZARD PROCEDURES

BIOLOGICAL HAZARDS AND CONTROLS

Rattlesnakes

Snakes are most noticeable between 0900 and 2100 but they are most active between 1500 and 1800. They prefer temperatures between 60 °F and 90 °F, and cannot tolerate temperatures over 110 °F. They are considered fairly inactive, but may strike, in temperatures below 40 °F. In approximately 20 percent of all snake bites, venom is not injected, and in many cases only a small amount is injected. Preventive measures include using a stick to beat the ground, placing hands and feet carefully, and maintaining alertness around streams and areas of poor visibility.

If venom has been injected, it often produces instant burning and swelling around the fang marks and edema within the first 5 minutes. There may be a tingling sensation of the tongue in as little as 20 seconds after the bite, with a subsequent numbness extending to the mouth, scalp, and fingers that increases in severity within a few moments. The tingling of the tongue is often associated with a rubbery or metallic taste. A bluish discoloration at the general site of the injury may occur 8 to 12 hours after the bite. The victim is often nauseated and may lose consciousness. If there is not swelling after the first half hour and there are no apparent symptoms, it is still important to observe the bite for at least 4 hours and treat it as a puncture wound. Systemic signs may be delayed with the mojave and panamint rattlesnakes.

When someone has been bitten by a snake, it is important to remove the victim from the snake because it may strike again. Keep the victim lying down and quiet. Place a constricting band 2 to 3 inches above the bite or proximal joint. Cleanse the wound thoroughly with soap and water and apply an antiseptic. Bandage the wound and immobilize it at heart level. Treat the victim for shock. Do not allow the victim to walk unless absolutely necessary. However, if the victim is alone and/or needs to walk from the scene, he or she should walk slowly and rest every 3 to 5 minutes. If possible, kill the snake for identification and take it to the hospital with the victim. Call ahead so that a proper anti-venom can be made available. Constriction bands should not be applied for more than 2 hours. Loosen the band for 90 seconds every 10 minutes. Tetanus booster shots are usually recommended.

Ants, Bees, Wasps, and Hornets

Stings from these insects are responsible for more deaths in the United States than bites and stings of all other venomous creatures. This is due to the victim's sensitization to the venom from repeated stings, which can result in anaphylactic reactions. The stinger may remain in the skin and should be removed by teasing or scraping rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic-corticosteroid lotion is often useful. People with known hypersensitivity to such stings should carry a kit containing an antihistamine and epinephrine.

Recently, African "killer" bees have been found in Texas. Fatalities associated with these bees have resulted when the victim has sustained incapacitating injuries from a

fall or slip and cannot escape them. The "killer" bees have the ability to sting repeatedly. Their venom is no more potent than that of the common honey bee. Observe the same first aid procedures as those stated in the previous paragraph.

Spiders

Almost all of the 30,000 species of spiders are venomous, but only a relatively small number have fangs long and strong enough to penetrate the human skin. Spiders are generally found in dark protected areas such as access ways to sanitary sewers, under ledges, or in pump housings and buildings.

Black widow spiders range in color from gray to brown to black, depending on the species. The abdomen is shiny black with a red hourglass or red spots. Although both male and female are venomous, only the latter has fangs large and strong enough to penetrate human skin. Mature females range in body length from 10 to 18 mm. The bite may cause a sharp, pinprick-like pain, but in some cases the bite is so minor that it goes unnoticed. Rarely is there any local skin reaction. The initial pain is sometimes followed by a dull, occasionally numbing pain in the affected extremity, and by pain and cramps in one or several of the large body muscles. Sweating, weakness, and varying degrees of headache and dizziness are common. The lymph nodes in the region of the bite will often be tender or painful. In severe cases, there is rigidity of the abdominal muscles and pain in the lower back, thighs, or abdomen. There is no effective first-aid treatment. Treat for shock and transport to the nearest medical facility.

Brown Recluse or Violin Spiders have abdomens that vary in color from grayish through orange and reddish-brown to dark brown. The back shell of the "violin" is brown to blackish and distinct from the pale yellow to reddish-brown background of the head and chest. This spider has 6 eyes grouped in 3 diads. Both male and female are venomous. They average 6 to 12 millimeters in body length. The bite of this spider produces about the same degree of pain as the sting of an ant, but sometimes the person is completely unaware of the bite. In most cases, a localized burning sensation develops, which may last for 30 to 60 minutes. The area often itches and becomes red and warm with a small blanched area around the immediate bite site. The reddened area enlarges and becomes purplish during the subsequent 1 to 8 hours. A small blister forms at the bite site, increases in size, and subsequently ruptures. The entire area may become swollen and painful. Other signs and symptoms include fever, malaise, stomach cramps, nausea, and vomiting. In severe cases, there may be breakdown of the red blood cells, renal failure, or death. All first aid measures should be avoided as the natural appearance of the bite is most important in determining the diagnosis. A cube of ice may be placed on the wound. Transport to the nearest medical facility.

Ticks

Ticks can carry many diseases. Transmission of Lyme disease from ticks to persons has been studied. There is evidence that symptoms of the disease are not immediately apparent, but begin after a period of time has passed. When in the field, check often for ticks. Ticks are best removed by applying gasoline or by slowly withdrawing the tick with flat-tip tweezers. Care should be taken not to leave any part of the tick in the wound and not to crush the tick. If the tick resists or cannot be completely removed,

seek medical attention. The bite should be cleansed and a corticosteroid lotion should be applied.

One of the symptoms of Lyme disease is a rash that looks like a "bulls-eye" with a small welt in the center. The rash visually develops several days to several weeks after the tick bite. Rocky Mountain Spotted Fever, which is also transmitted by ticks, also causes a rash of red spots under the skin 3 to 10 days after the bite. Both diseases cause chills, fever, headache, fatigue, stiff neck, and bone pain. Medical attention should be sought if these symptoms occur.

Poisonous Plants

Poison oak and poison ivy are bush-like plants. Poison oak and poison ivy are identified by three or five leaves radiating from a stem. The plant tissues have an oleoresin that is active in live, dead, and dried parts. The oleoresin may be carried by smoke, dust, contaminated clothing, and animal hair. Signs and symptoms include redness, swelling, and sometimes intense itching. Blisters form during the subsequent 24 hours. Crusting and scaling occur within a few days. In the absence of complications, healing is complete in approximately 10 days. Wash any exposed skin with a mild soap and water but do not scrub the area.

Rodents

Recently, a fatal respiratory illness has been associated with a Hantavirus. This respiratory illness has symptoms similar to the flu. Without medical intervention, the victim experiences respiratory and cardiac failure. This virus is shed in the droppings and urine of infected rodents, mice, and rats.

Any droppings (small rod-like, dry material), nesting activities, or dead animals are to be reported immediately to the Site Health and Safety Manager (SHSM). A decision will be made as to the proper method of eliminating the infestation and cleaning up droppings.

GENERIC CHEMICAL HAZARD PROFILES

The following information is intended to be generic to provide a brief overview. Detailed information relevant to hazards associated with specific chemical substances of potential concern at this site are provided in Appendix K.

Calibration Gases

Common pressurized gases used to calibrate air monitoring instrumentation include heptane, hexane, hydrogen, hydrogen sulfide, oxygen, and pentane. Under ambient conditions, these gases are flammable. The cylinders are pressurized; they can become mini-torpedoes if the valve stem is severed from the cylinder. Handle them carefully.

The primary routes of entry into the body are inhalation and skin absorption, so these substances should be handled in a well-ventilated area. Symptoms of exposure include lightheadedness, nausea, headache, numb extremities, dermatitis, loss of appetite, chemical pneumonia, and giddiness. Exposure to elevated levels of such gases can damage the skin, eyes, and respiratory system, and can cause death.

Corrosives

Corrosives include acids, bases/caustics, and inorganic halogen salts. Some of the more common acids include acetic, citric, hydrochloric, hydrofluoric, nitric, perchloric, phosphoric, picric, and sulfuric acids. Some of the more common caustics include ammonia, ammonium hydroxide, potassium hydroxide, sodium hydroxide, and sodium hypochlorite. Inorganic halogen salts are compounds containing halogens (chlorine, bromine, fluorine) such as sodium chloride, potassium bromate, and sodium fluoride, which are corrosive to metals and finishes but are relatively insignificant health threats.

For the most part, corrosives are nonflammable, although the liquid forms are moderately to highly volatile. Perchloric acid (perchlorates) and picric acid, when dry, can be explosive.

The primary routes of entry into the body are by inhalation, ingestion, and skin contact. Symptoms of exposure include tissue burns, nose and throat inflammation, and pulmonary edema. Corrosives can cause extensive damage to the respiratory system, skin, and eyes.

Metals

Metals commonly associated with batteries, paints, plating operations, and petroleum-based products include lead, arsenic, cadmium (a probable human carcinogen), chromium (a probable human carcinogen), copper, nickel, silver, tin, and zinc compounds. Petroleum-based products such as lubricants and especially leaded gasolines, contain organic lead compounds such as tetraethyl and tetramethyl lead, as well as assorted inorganic metals mentioned above and others such as antimony, barium, beryllium, cobalt, magnesium, manganese, and vanadium. Explosive powders used in ordnances also contain aluminum.

Metals pose a health hazard in their solid form, especially as airborne dusts. The primary routes of entry into the body are by inhalation, ingestion, and skin contact. Organic compounds, such as tributyltin, may penetrate the skin without producing appreciable local injury. Symptoms of exposure include eye, skin, and upper respiratory system irritation; headaches; insomnia; metallic taste in the mouth; lassitude; pallor; anorexia; constipation; abdominal pain; anemia; and tremors. Heavy metals can cause damage to the central nervous system, kidneys, respiratory system, and liver. Cancers of the lungs and bones are associated with metal intoxication.

Petroleum-Based Hydrocarbons

Lubricants, oils, fuels, and gasoline contain petroleum-based hydrocarbons such as benzene and its derivatives, naphthas, toluene, xylenes, and coal tar pitch volatiles. Coal tar pitch volatiles are also known as polycyclic hydrocarbons (PCHs) or polynuclear aromatics (PNAs). Benzene and PNAs are known carcinogens. Petroleum-based hydrocarbon materials also generally contain metal contaminants. (Refer to the metals profile.) Lubricants and waste oils are slightly to highly volatile and flammable. Fuels and gasoline are extremely volatile and flammable.

The primary routes of entry into the body are by ingestion and skin contact or dermal absorption. Inhalation of the more volatile constituents, such as toluene, xylenes, naphthas, and benzene (a known human carcinogen) and its derivatives, can be toxic. Acute symptoms of exposure include eye, skin, and upper respiratory system irritation, giddiness, confusion, headache, nausea, staggered gait, and fatigue. High-level and chronic exposure can cause damage to the liver, kidneys, and bone marrow, and can cause skin cancer and leukemia.

Ionizing Radiation

Ionizing radiation is radiation that changes the structure of individual atoms by ionizing them. Ionization is the process by which electrically neutral atoms are changed to positively and negatively charged ions (atoms and subatomic particles). The ions produced in turn ionize more atoms. Substances that produce ionizing radiation are called radioactive. Ionizing radiation is categorized into four types of rays.

- X-rays are man-made radiation produced by bombarding a metallic target with electrons at a high speed in a vacuum. The energy of X-rays is millions of times greater than that of light and radio waves. Because of this high energy level, X-rays penetrate a variety of materials, including body tissue.
- Gamma rays are naturally occurring radiation that are almost identical to X-rays.
- Beta rays also occur in nature. A beta ray has more mass and less energy than a gamma ray, so it does not penetrate matter as far as gamma rays and X-rays.
- Alpha rays are another naturally occurring form of ionizing radiation.

When radiation hits a living cell, it may ionize an atom, which may break chemical bonds within the cell. This can result in cellular or chromosomal injuries. Radiation can cause cancer or leukemia. It can also cause genetic mutation if it hits the genetic material in a reproductive cell. In high doses, it can burn the skin, make hair fall out, and cause radiation sickness and death.

Primary routes of entry into the body are by inhalation, ingestion, and dermal absorption. Radiation monitoring will be conducted during site activities to limit external exposure.

Solvents (Nonhalogenated) And Paints

Some of the more common constituents of nonhalogenated solvents and paint wastes include acetone, methyl ethyl ketone (MEK), toluene, xylenes, alkyl acetates, acrylates, and alcohols. These substances are slightly to highly volatile and are moderately to highly flammable.

Primary routes of entry into the body are by inhalation, ingestion, and dermal absorption. Symptoms of exposure include irritation of the eyes, skin, or upper respiratory system, headaches, drowsiness, dermatitis, dizziness, confusion, giddiness, and euphoria. Higher levels of exposure can cause narcosis and damage to the kidneys and blood.

APPENDIX G
DECONTAMINATION PROCEDURES

APPENDIX G

DECONTAMINATION PROCEDURES

CONTAMINATION REDUCTION CORRIDOR

An area within the Contamination Reduction Zone (CRZ) is designated the Contamination Reduction Corridor (CRC). The CRC controls access into and out of the Exclusion Zone (EZ) and confines personnel decontamination activities to a limited area. The size of the corridor depends on the number of stations in the decontamination procedure, overall dimensions of work control zones, and amount of space available at the site. Whenever possible, it should be a straight path.

The CRC boundaries should be conspicuously marked, with entry and exit restricted. The far end is the hotline - the boundary between the EZ and CRZ. Personnel exiting the EZ must go through the CRC. Everyone in the CRC should be wearing the Level of Protection designated for the decontamination crew. Another corridor may be required for the entrance and exit of heavy equipment needing decontamination. Within the CRC, distinct areas are set aside for decontamination of personnel, portable field equipment, and removed clothing. These areas should be marked and personnel restricted to those wearing the appropriate Level of Protection. All activities within the corridor are confined to decontamination.

Personnel protective clothing, respirators, monitoring equipment, and sampling supplies, are all maintained outside of the CRC. Personnel don their protective equipment away from the CRC and enter the EZ through a separate access control point at the hotline.

EXTENT OF DECONTAMINATION REQUIRED

The original decontamination plan must be adapted to specific conditions found at sites. These conditions may require more or less personnel decontamination than planned, depending on a number of factors.

Type of Contaminant. The extent of personnel decontamination depends on the effects the contaminants have on the body. The more toxic a substance is, the more extensive or thorough decontamination must be. Whenever it is known or suspected that personnel can become contaminated with highly toxic or skin-destructive substances, a full decontamination procedure should be followed. If less hazardous materials are involved, the procedure can be downgraded.

Amount of Contamination. The amount of contamination on protective clothing is usually determined visually. If clothing is badly contaminated, a thorough decontamination is generally required. Gross material remaining on the protective clothing for any extended period of time may degrade or permeate it. This likelihood increases with higher air concentrations and greater amounts of liquid contamination. Gross contamination also increases the probability of personnel contact. Wipe tests may help determine the type and quantity of surface contaminants.

Level of Protection. The Level of Protection and specific pieces of clothing worn determine, on a preliminary basis, the layout of the decontamination line. Each Level of Protection incorporates different problems in decontamination and doffing of the equipment. For example, decontamination of the harness straps and backpack assembly of the self-contained breathing apparatus is difficult. A butyl rubber apron worn over the harness makes decontamination easier. Clothing variations and different Levels of Protection may require adding or deleting stations in the original decontamination procedure; however, added clothing can contribute to heat stress and must be considered from this viewpoint.

Work Function. The work each person does determines the potential for contact with hazardous materials. In turn, the work dictates the layout of the decontamination line. Observers, photographers, operators of air samplers, or others in the EZ performing tasks that may not bring them in contact with contaminants may not need, for example, to have their garments washed and rinsed. Others in the EZ with a potential for direct contact with the hazardous material will require more thorough decontamination. Different decontamination lines could be set up for different job functions, or certain stations in a line could be omitted for personnel performing certain tasks.

Location of Contamination. Contamination on the upper areas of protective clothing poses a greater risk to the worker because volatile compounds may generate hazardous levels of airborne contamination breathing concentration both for the worker and for the decontamination personnel. There is also an increased probability of contact with skin when doffing the upper part of clothing.

Reason for Leaving Site. The reason for leaving the EZ also determines the need and extent of decontamination. A worker leaving the EZ to pick up or drop off tools or instruments and immediately returning may not require decontamination. A worker leaving to get a new air cylinder or change a respirator or canisters, however, may require some degree of decontamination. Individuals departing the CRC for a break, lunch, or at the end of the day must be thoroughly decontaminated.

Effectiveness of Decontamination. There is no method to immediately determine how effective decontamination is in removing contaminants. Discolorations, stains, corrosive effects, and substances adhering to objects indicate that contaminants have not been removed; however, observable effects only indicate surface contamination and not permeation (absorption) into clothing. Many contaminants are not readily visible to the eye.

DECONTAMINATION EQUIPMENT AND SOLUTIONS

Decontamination equipment, materials, and supplies are generally selected based on availability, ease of decontamination, and disposability. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handle brushes are used to remove contaminants. Water in buckets or garden sprayers is used for rinsing. Large galvanized wash tubs, stock tanks, or wading pools can hold wash and rinse solutions. Large plastic garbage cans or other similar containers lined with plastic bags store contaminated clothing and equipment. Contaminated liquids can be stored temporarily in metal or plastic cans or drums. Other gear includes paper or cloth towels for drying protective clothing and equipment.

Personnel protective equipment, sampling tools, and other equipment are usually decontaminated by scrubbing with detergent-water (such as Alconox) using a soft-bristle brush followed by rinsing with copious amounts of water. Solvents are usually used with sampling gear, not protective gear. The appropriate decontamination solution must be selected in consultation with an experienced chemist. Clothing which is heavily contaminated or cannot be decontaminated should be properly disposed of.

ESTABLISHMENT OF PROCEDURES

Once decontamination procedures have been established, all personnel requiring decontamination must be given precise instructions (and practice, if necessary). Compliance must be frequently checked. The time it takes for decontamination must be ascertained. Personnel wearing self-contained breathing apparatus (SCBAs) must leave their work area with sufficient air to walk to the CRC and go through decontamination. Disposal of decontamination solutions, clothing and other material should be considered and checked with local, state and Federal authorities.

DECONTAMINATION DURING MEDICAL EMERGENCIES

Part of overall planning for site activities is managing medical emergencies. The plan should provide for:

- Team members to be fully trained in first aid and CPR;
- Arrangements with the nearest medical facility for transportation and treatment of injured, and for treatment of personnel suffering from exposure to chemicals;
- Consultation services with a toxicologist;
- Emergency eye washes, showers, and/or wash stations; and
- First aid kits, blankets, stretcher, and resuscitator.

In addition, the plan should have established methods for decontaminating personnel with medical problems and injuries. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt life-saving first aid and/or medical treatment is required, decontamination procedures should be omitted. Whenever possible, response personnel should accompany contaminated victims to the medical facility to advise on matters involving decontamination.

Physical injuries can range from a sprained ankle to a compound fracture, and from a minor cut to massive bleeding. Depending on the seriousness of the injury, treatment may be given at the site by trained personnel. For more serious injuries, additional assistance may be required at the site, or the victim may have to be treated at a medical facility.

Life-saving care should be instituted immediately without considering decontamination. The outside garments can be removed (depending on the weather) if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory masks and backpack assemblies must always be removed. Fully encapsulating suits or chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber, or blankets to help prevent contaminating the inside of ambulances and/or medical personnel. Outside

garments are then removed at the medical facility. No attempt should be made to wash or rinse the victim. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

Heat-related illnesses range from heat fatigue to heat stroke. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately. Appendix E presents a discussion of symptoms of heat stress and the recommended treatment procedures.

Exposure to chemicals can be divided into two categories:

- Injuries from direct contact such as acid burns or inhalation of toxic chemicals, and
- Potential injury due to gross contamination on clothing or equipment.

For the inhaled contaminant, treatment can only be given by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract the substance's effect. First aid usually involves flooding the affected area with water; however, for a few chemicals, water may cause more severe problems.

When protective clothing is grossly contaminated, contaminants may be transferred to treatment personnel or the wearer and cause injuries. Unless severe medical problems have occurred simultaneously with splashes, the protective clothing should be washed off as rapidly as possible and carefully removed. Workers showing symptoms of acute exposure should be transported immediately following appropriate decontamination to the nearest medical facility.

LEVEL OF PROTECTION FOR DECONTAMINATION WORKERS

The Level of Protection worn by decontamination workers is determined by:

- Expected or visible contamination on workers;
- Type of contaminant and associated respiratory and skin hazards;
- Total vapor/gas concentrations in the CRC;
- Particulates and specific inorganic or organic vapors in the CRC;
- Results of swipe tests; or
- The presence (or suspected presence) of highly toxic or skin-destructive materials.

In most instances, decontamination workers are in the same Level of Protection as site workers. The standard selection criteria apply.

APPENDIX H
WORK ZONE PROCEDURES

APPENDIX H

WORK ZONE PROCEDURES

ZONE 1: EXCLUSION ZONE

The Exclusion Zone (EZ), the innermost of three concentric areas is the zone where contamination does, or could, occur. All people entering the EZ must wear prescribed Levels of Protection. An entry and exit check point must be established at the periphery of the zone to regulate the flow of personnel and equipment into and out of the zone and to verify that the established procedures to enter and exit are followed.

The outer boundary of Zone 1, the Hotline, is initially established by visually surveying the immediate environs of the site or incident and determining where the hazardous substances involved are located; where any drainage, leachate, or spilled material is; and whether any soil discolorations are visible. Guidance in determining the boundaries is also provided by data from the initial site survey indicating the presence of contaminated air, water or soil, the presence of combustible gases, radiation, or an oxygen deficient atmosphere.

Additional factors that should be considered include the distances needed to prevent fire or an explosion from affecting personnel outside the zone, the physical area necessary to conduct site operations, and the potential for contaminants to be blown from the area. Once the Hotline has been determined, it should be physically secured, fenced, or well-defined by landmarks. During subsequent site operations, the boundary may be modified and adjusted as more information becomes available.

All personnel within the EZ must wear the required Level of Protection. Personnel protective equipment is designated based on site-specific conditions, including the type of work to be done and the hazards that might be encountered. Frequently within the Exclusion Zone, different Levels of Protection are justified. Sub-areas are specified and conspicuously marked as to whether Level A, B, or C Protection is required. The Level of Protection is determined by the measured concentration of substances in air, potential for contamination, and the known or suspected presence of highly toxic substances.

Different Levels of Protection in the EZ might also be designated by job assignment. For example, collecting samples from open containers might require Level B protection, while for walk-through ambient air monitoring Level C protection might be sufficient. The assignment, when appropriate, of different Levels of Protection within the Exclusion Zone generally provides a more flexible, effective, and less costly operation, while still maintaining a high degree of safety.

ZONE 2: CONTAMINATION REDUCTION ZONE

Between the EZ and the Support Zone (SZ) is the Contamination Reduction Zone (CRZ), which provides a transition between contaminated and clean zones. Zone 2 serves as a buffer to further reduce the probability of the clean zone becoming contaminated or being affected by other existing hazards. It provides additional assurance that the physical transfer of contaminating substances by people, equipment, or in the air is

limited through a combination of decontamination, distance between Exclusion and Support Zones, air dilution, zone restrictions, and work functions.

Initially, the CRZ is considered to be a non-contaminated area. At the boundary between the EZ and the CRZ, decontamination stations are established, one for personnel and one for heavy equipment. These stations should be separated by a minimum of 3 feet or more, such as when steam cleaning is used. Depending on the size of the operation, more than two stations may be necessary. Exit from the EZ is through a decontamination station.

As operations proceed, the area around the decontamination station may become contaminated, but to a much lesser degree than the EZ. On a relative basis, the amount of contaminants should decrease from the Hotline to the SZ due to the distance involved and the decontamination procedures used.

The boundary between the SZ and the CRZ, the Contamination Control Line (CCL), separates the possibly low contamination area from the clean SZ. Access to the CRZ from the SZ is through a control point. Personnel entering there would wear the prescribed personnel protective equipment, if required, for working in the CRZ. Entering the SZ from the CRZ requires removal of any protective equipment worn in the CRZ.

ZONE 3: CLEAN ZONE

The Clean Zone (CZ), the outermost part of the site, is considered a non-contaminated or clean area. Support equipment (command post, equipment trailer) is located in the zone; traffic is restricted to authorized response personnel. Since normal work clothes are appropriate within this zone, potentially contaminated personnel clothing, samples, and equipment are not permitted, but are left in the CRZ until they are decontaminated.

The location of the command post and other facilities in the CZ depends on a number of factors.

Accessibility: topography, open space available, locations of highways and railroad tracks, or other limitations.

Wind direction: preferably the support facilities should be located upwind of the Exclusion Zone; however, shifts in wind direction and other conditions may be such that an ideal location based on wind direction alone does not exist. Therefore, a greater distance from the hot area may be required.

Resources: adequate roads, power lines, water, shelter, and sanitation.

CONSIDERATIONS WHEN ESTABLISHING WORK ZONES

The distances between the Hotline, CCL, and command post, and the size and shape of each zone have to be based on specific site conditions. Considerable judgment is needed to ensure that the distances between zone boundaries are large enough to allow room for the necessary operations, provide adequate distance to prevent the spread of contaminants, and eliminate the possibility of injury due to explosion or fire. Long-term operations would involve developing reasonable methods to determine if material is being transferred between zones and to assist in modifying site boundaries.

The following criteria should be considered in establishing area dimensions and boundary distances.

- Physical and topographical features of the site.
- Weather conditions.
- Field/laboratory measurements of air contaminants and environmental samples.
- Air dispersion calculations.
- Potential for explosion and flying debris.
- Physical, chemical, toxicological, and other characteristics of the substances present.
- Cleanup activities required.
- Potential for fire.
- Area needed to conduct operations.
- Decontamination procedures.
- Dimensions of contaminated area.
- Potential for exposure.
- Surrounding industries or other sources of contamination other than the site itself.

OTHER CONSIDERATIONS IN ESTABLISHING WORK ZONES

The use of a three-zone system, access control points, and exacting decontamination procedures provides a reasonable assurance against the translocation of contaminating substances. This site control system is based on a "worst case" situation. Less stringent site control and decontamination procedures may be utilized if more definitive information is available on the substances involved and the hazards they present. This information can be obtained through air monitoring, instrument survey and sampling, and technical data concerning the characteristics and behavior of materials present.

APPENDIX I

THIRD PARTY GUIDELINES

APPENDIX I

THIRD PARTY GUIDELINES

A third party is any individual or organization not in a direct contractual working relationship with The Environmental Company, Inc. (TEC). An important concept in understanding third party protection is that Health and Safety Plans (HSPs) are primarily *occupational plans*; i.e., they are designed to assure the health and safety of the worker. An HSP usually does not provide the risk assessment and/or endangerment assessment necessary to judge potential harm to third parties.

Another important concept is that in all instances, TEC interests require rigorous enforcement of all aspects of health and safety, particularly with regard to third parties.

Protection of third parties is generally associated with site control and implementation of appropriate site investigation protocols, monitoring, and remedial response procedures. Techniques such as fencing, posting of contaminated areas, and providing a 24-hour guard are some of the major mechanisms whereby third parties can be protected. In all instances, third parties visits will be logged into the Site Visitors Log, or other appropriate document.

In order to protect third parties, the Project Health and Safety Manager (PHSM) and Site Health and Safety Manager (SHSM) may be required to work closely with representatives of the public. A public relations specialist may have to be designated.

TEC employees cannot stop the actions of parties not under direct contractual agreement with TEC unless specifically stated in the HSP. This includes Federal and State employees, as well as Potential Responsible Parties (PRPs).

TEC employees are required to make a "good faith" effort to inform third parties of potential hazards. Note, however, that documents such as the HSPM and the HSP may not be released to the public without first obtaining concurrence and permission from the client through the Project Manager (PM) and the Corporate Health and Safety Manager (CHSM). Any individual scheduled to visit the site must review the HSP and document his/her review on the Visitor/Trainee Agreement Form included in Appendix L.

TEC employees shall document any action by any individual (including Federal and State employees and PRPs) that is in violation of the HSP. The written account of the episode is forwarded to the HSM in charge of the site or operation and recorded in the Visitors Log.

Note that work may have to cease if the actions of a third party in any way compromise the policies and procedures of the HSPM. In addition, the SHSM or HSM may have to suspend site operations in order to protect the health and safety of third parties.

Potential subcontractors may be required to visit a site or operation for the purpose of estimating cost, or obtaining other appropriate and necessary information. The regional office or subsidiary HSM is required to determine if HSPM requirements apply to the visit. If they do not, the subcontractor is exempted from HSPM requirements. The *Bidders Conference Agreement Form* (TEC 1992), or equivalent, is executed to protect

TEC and subcontractor interests. If the standard form is not used, any modification must be approved by TEC's Corporate Legal Department.

APPENDIX J
MATERIAL SAFETY DATA SHEETS (MSDSs)

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6505

NIIN: 001444657

Manufacturer's CAGE: 70829

Part No. Indicator: A

Part Number/Trade Name: 9008, ACETONE

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General Information

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Item Name: ACETONE, NF *

Manufacturer's Name: J.T.BAKER CHEMICAL CO *

Manufacturer's Street: 222 RED SCHOOL LANE *

Manufacturer's P. O. Box: .

Manufacturer's City: PHILLIPSBURG *

Manufacturer's State: NJ *

Manufacturer's Country: US *

Manufacturer's Zip Code: 08865 *

Manufacturer's Emerg Ph #: (201) 859-2151/800-424-9300 (CHEMTR) *

Manufacturer's Info Ph #: 800-JTBAKER *

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code: C

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SM *

Date MSDS Prepared: 05JAN94 *

Safety Data Review Date: 19MAY94 *

Supply Item Manager: GSA *

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BNSYW

Specification Number: O-C-265 *

Spec Type, Grade, Class: NONE *

Hazard Characteristic Code: F2 *

Unit Of Issue: ? *

Unit Of Issue Container Qty: 1 (?) EACH *

Type Of Container: BOTTLE *

Net Unit Weight: UNKNOWN *

NRC/State License Number: NONE *

Net Explosive Weight:

Net Propellant Weight-Ammo: NONE *

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO *

Ingredient: ACETONE (SARA III) *

Ingredient Sequence Number: 01

Percent: 90-100 *

Ingredient Action Code: C

Ingredient Focal Point: N

NIOSH (RTECS) Number: AL3150000 *

CAS Number: 67-64-1 *

OSHA PEL: 1000PPM *

ACGIH TLV: 750PPM/1000STEL;9293 *

Other Recommended Limit: NOT ESTABLISHEDN/K *

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, COLORLESS LIQUID. SWEET ODOR. *

Boiling Point: 133F, 56C *

Melting Point: -139F, -95C *

Vapor Pressure (MM Hg/70 F): 184 MM *

Vapor Density (Air=1): 2.0 *

Specific Gravity: 0.79 *

Decomposition Temperature: UNKNOWN *

Evaporation Rate And Ref: 14.4 (BUTYL ACETATE=1) *

Solubility In Water: COMPLETE (100%) *

Percent Volatiles By Volume: 100 *

Viscosity:

pH: "N/A" *

Radioactivity:

Form (Radioactive Matl):

Magnetism (Milligauss):

Corrosion Rate (IPY): UNKNOWN *

Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: -2F, -18C *

Flash Point Method: CC *

Lower Explosive Limit: 2.2% *

Upper Explosive Limit: 13% *

Extinguishing Media: USE ALCOHOL FOAM, DRY CHEMICAL OR CO2. (WATER MAY BE INEFFECTIVE). *

Special Fire Fighting Proc: WEAR PROPER PROTECTIVE EQUIPMENT AND SCBA W/ FULL FACEPIECE OPERATED PRESSURE DEMAND MODE. USE WATER TO KEEP FIRE- EXPOSED CONTAINERS COOL. *

Unusual Fire And Expl Hazrds: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG GROUND OR FLOOR, THEN 'FLASH BACK' FROM A DISTANT IGNITION SOURCE. CONTACT W/STRONG OXIDIZERS MAY CAUSE FIRE. *

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Reactivity Data

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Stability: YES *

Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION. *

Materials To Avoid: STRONG OXIDIZERS, STRONG ACIDS & BASES, HALOGEN COMPOUNDS, AMINES & AMMONIA, *

Hazardous Decomp Products: CO, CO2. *

Hazardous Poly Occur: NO *
Conditions To Avoid (Poly): WILL NOT OCCUR *

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Health Hazard Data

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LD50-LC50 Mixture: LD50 (ORAL RAT) IS 9750 MG/KG. *

Route Of Entry - Inhalation: YES *

Route Of Entry - Skin: YES *

Route Of Entry - Ingestion: YES *

Health Haz Acute And Chronic: INHALED:IRRITATION NOSE,THROAT,HEADACHE, NAUSEA,VOMITING,DIZZINESS,NARCOSIS,RESPIRATORY FAILURE,LOW BLOOD PRESSURE, CNS DEPRESSION,COMA. SKIN:IRRITATION,POSSIBLE DERMATITIS &/OR ABSORPTION. EYE:SEVERE IRRITATION,POSSIBLE TEMP CORNEAL DAMAGE. INGESTED:G/I IRRITATION,HEADACHE,NAUSEA,CNS DEPRES. CHRONIC:LIVER/KIDNEY DAMAGE. *

Carcinogenicity - NTP: NO *

Carcinogenicity - IARC: NO *

Carcinogenicity - OSHA: NO *

Explanation Carcinogenicity: NONE IDENTIFIED *

Signs/Symptoms Of Overexp: INHALED:IRRITATION NOSE,THROAT,HEADACHE, NAUSEA,VOMITING,DIZZINESS,NARCOSIS,RESPIRATORY FAILURE,LOW BLOOD PRESSURE, CNS DEPRESSION,COMA. SKIN:IRRITATION POSSIBLE DERMATITIS. EYE:SEVERE IRRITATION,POSSIBLE TEMP CORNEAL DAMAGE. INGESTED:G/I IRRITATION,HEADACHE, NAUSEA,DIZZINESS,CNS DEPRESSION. *

Med Cond Aggravated By Exp: CHRONIC RESPIRATORY DISEASE, SKIN DISORDERS, EYE DISORDERS. *

Emergency/First Aid Proc: IF ANY IRRITATION PERSISTS OR IS SEVERE, SEE A DOCTOR. EYE:FLUSH W/WATER 15 MIN. SKIN:FLUSH WITH WATER. INHALED:REMOVE TO FRESH AIR. AID/RESTORE BREATHING IF NECESSARY. INGESTED:DO NOT INDUCE VOMITING. GIVE LARGE AMOUNTS WATER. NOTHING BY MOUTH IF UNCONSCIOUS. NOTE TO PHYSICIAN:ASPIRATION HAZARD! IF NECESSARY TO EVACUATE STOMACH, USE METHOD LEAST LIKELY TO CAUSE ASPIRATION INTO LUNGS. *

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: WEAR SUITABLE PROTECTIVE CLOTHING. ELIMINATE ALL IGNITION SOURCES. STOP LEAK IF POSSIBLE W/OUT RISK. USE H2O SPRAY TO REDUCE VAPORS. TAKE UP W/SAND/OTHER NON-COMBUSTIBLE ABSORBANT & PLACE INTO CONTAINER FOR DISPOSAL. FLUSH AREA W/WATER. *

Neutralizing Agent: NO INFORMATION GIVEN ON MSDS BY MFR. *

Waste Disposal Method: DISPOSE I/A/W ALL APPLICABLE FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZARDOUS WASTE NUMBER:U002 HMIS SUGGESTS INCINERATION AS DISPOSAL METHOD. *

Precautions-Handling/Storing: KEEP TIGHTLY CLOSED. STORE IN COOL, DRY, WELL-VENTED, FLAMMABLE LIQUID STORAGE AREA. ISOLATE FROM INCOMPATIBLE MATERIALS. *

Other Precautions: BOND & GROUND CONTAINERS WHEN TRANSFERRING LIQUID. *

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Control Measures

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Respiratory Protection: RESPIRATORY PROTECTION REQUIRED ABOVE TLV: AT CONCENTRATIONS UP TO 5000 PPM, CHEMICAL CARTRIDGE RESPIRATOR W/ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, AN SCBA IS RECOMMENDED. *

Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS. *

Protective Gloves: BUTYL RUBBER GLOVES. *

Eye Protection: SAFETY (CHEMICAL SPLASH) GOGGLES *

Other Protective Equipment: NO FURTHER EQUIPMENT GIVEN ON MSDS BY MFR. *

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Work Hygienic Practices: MFR: ? HMIS:USE GOOD CHEMICAL HYGIENE PRACTICE.
AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING. *
Suppl. Safety & Health Data: NONE *

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 5330

NIIN: 002649599

Manufacturer's CAGE: UNKNO

Part No. Indicator: A

Part Number/Trade Name: ASBESTOS

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General Information

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Item Name: PACKING MATERIAL

Manufacturer's Name: UNKNOWN/PROCURED BY DEFENSE DEPOT, OGDEN, UTAH

Manufacturer's Street: NOT RELEVANT

Manufacturer's P. O. Box:

Manufacturer's City: NOT RELEVANT

Manufacturer's State:

Manufacturer's Country:

Manufacturer's Zip Code:

Manufacturer's Emerg Ph #:

Manufacturer's Info Ph #:

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SD

Date MSDS Prepared: 23NOV93

Safety Data Review Date: 23NOV93

Supply Item Manager: KZ

MSDS Preparer's Name: DGSC-SSH

Preparer's Company: DEFENSE GENERAL SUPPLY CENTER

Preparer's St Or P. O. Box: 8000 JEFFERSON-DAVIS HIGHWAY

Preparer's City: RICHMOND

Preparer's State: VA

Preparer's Zip Code: 23297-5680

Other MSDS Number:

MSDS Serial Number: BSCTZ

Specification Number: HH-P-51

Spec Type, Grade, Class: TYPE 3, GRADE A

Hazard Characteristic Code: T6

Unit Of Issue: FT

Unit Of Issue Container Qty: N/K

Type Of Container: N/K

Net Unit Weight: N/K

NRC/State License Number: NOT RELEVANT

Net Explosive Weight: N/R

Net Propellant Weight-Ammo: N/R

Coast Guard Ammunition Code: N/R

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Ingredients/Identity Information

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316103

Proprietary: NO
Ingredient: ASBESTOS (FRIABLE) (SARA III)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: CI6425000
CAS Number: 1332-21-4
OSHA PEL: SEE 1910.1001
ACGIH TLV: 0.2 - 2 FIBERS/CC
Other Recommended Limit: NONE RECOMMENDED

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Physical/Chemical Characteristics

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Appearance And Odor: PACKING MATERIAL
Boiling Point: N/R
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): N/R
Vapor Density (Air=1): N/R
Specific Gravity: UNKNOWN
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: NOT RELEVANT
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: N/R
Viscosity:
pH: N/R
Radioactivity: N/R
Form (Radioactive Matl): N/R
Magnetism (Milligauss): N/R
Corrosion Rate (IPY): N/R
Autoignition Temperature: N/R

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Fire and Explosion Hazard Data

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Flash Point: N/R
Flash Point Method: N/R
Lower Explosive Limit: N/R
Upper Explosive Limit: N/R
Extinguishing Media: USE WATER AND FOAM AS EXTINGUISHING AGENTS.
Special Fire Fighting Proc: AVOID BREATHING FUMES. WEAR PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS OPERATED IN THE POSITIVE PRESSURE MODE.
Unusual Fire And Expl Hazrds: ASBESTOS FIBERS MAY BE RELEASED.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): AVOID INHALATION OR INGESTION OF DUST.
Materials To Avoid: NONE KNOWN
Hazardous Decomp Products: ASBESTOS FIBERS MAY BE RELEASED.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

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Health Hazard Data

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LD50-LC50 Mixture: LD50 (ORAL RAT) IS NOT RELEVANT.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: ACUTE- NONE UNDER NORMAL CONDITIONS OF USE. GRINDING, SANDING/MACHINING MAY PRODUCE NUISANCE PARTICULATES THAT CAN CAUSE IRRITATION OF EYES, SKIN, GI TRACT & RESPIRATORY PASSAGES. CHRONIC- LONG TERM EXPOSURE TO ASBESTOS CAN CAUSE IRREVERSIBLE ASBESTOSIS, LUNG DISEASE & LUNG CANCER. SMOKING GREATLY INCREASES THE RISKS.

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: YES

Explanation Carcinogenicity: ASBESTOS IS REGULATED BY OSHA AS A CARCINOGEN.

Signs/Symptoms Of Overexp: NONE UNDER NORMAL CONDITIONS OF USE. HOWEVER, GRINDING, SANDING OR MACHINING MAY PRODUCE NUISANCE PARTICULATES THAT CAN CAUSE IRRITATION OF EYES, SKIN, GASTROINTESTINAL TRACT AND RESPIRATORY PASSAGES. MAY CAUSE NAUSEA, VOMITING AND DIARRHEA.

Med Cond Aggravated By Exp: PERSONS WITH PRE-EXISTING SKIN DISORDERS SUCH AS DERMATITIS, RESPIRATORY PROBLEMS, LUNG DISEASE, BRONCHIAL HYPER-REACTIVITY OR ANY CONDITION THAT MAY BE AGGRAVATED BY NUISANCE DUST OR FIBERS.

Emergency/First Aid Proc: SEEK MEDICAL ATTENTION IF SYMPTOMS DEVELOP. IN CASE OF EYE IRRITATION GENTLY RINSE WITH WATER FOR 15 MINUTES WHILE KEEPING EYELIDS OPEN. DO NOT RUB EYES. SKIN: WASH FREQUENTLY WITH SOAP AND WATER. INHALATION: REMOVE TO FRESH AIR. INGESTION: DO NOT INDUCE VOMITING. SEE A PHYSICIAN.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: TREAT DUST AS FREE ASBESTOS. DO NOT DRY SWEEP OR USE COMPRESSED AIR. WET METHOD SHOULD BE USED FOR EXTRACTION OF DUST AND DEBRIS. HIGH EFFICIENCY PARTICULATE APPARATUS (HEPA) VACUUMS SHOULD BE USED. AVOID WATER-POLLUTION.

Neutralizing Agent: NOT APPLICABLE.

Waste Disposal Method: APPROVED LANDFILL. WASTE SHOULD BE CONTAINED IN IMPERMEABLE BAGS, LABELED AND DISPOSED IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions-Handling/Storing: STORAGE- AVOID CREATING DUST BY SANDING OR GRINDING THE PRODUCT.

Other Precautions: USE IN WELL VENTILATED AREA. AVOID BREATHING DUST OR FIBERS. MINIMIZE CONTACT WITH SKIN. AVOID CONTACT WITH EYES. DO NOT RAISE DUST. WASH THOROUGHLY AFTER HANDLING AND BEFORE EATING OR DRINKING. KEEP AWAY FROM REACH OF CHILDREN.

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Control Measures

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Respiratory Protection: USE NIOSH APPROVED HIGH EFFICIENCY FIBERS/FUMES RESPIRATOR WHEN AIRBORNE FIBER CONCENTRATIONS EXCEED THE PEL.

Ventilation: LOCAL/GENERAL TO MAINTAIN PEL/TLV. NONE NORMALLY REQUIRED.

Protective Gloves: LEATHER, COTTON OR RUBBER IF FRIABLE

Eye Protection: DUST-RESISTANT SAFETY GOGGLES IF FRIABLE

Other Protective Equipment: EYE WASH STATION AND SAFETY SHOWER, WORK CLOTHING AND APRON AS REQUIRED. DO NOT WEAR CONTACT LENSES

316105

Work Hygienic Practices: DON'T TAKE PROTECTIVE GEAR/CLOTHING HOME IF EXPOSED TO DUST. DON'T SHAKE. DON'T EAT IN AREA WHERE ASBESTOS/DUST PRESENT.

Suppl. Safety & Health Data: AS MANUFACTURED, PACKING MATERIAL CONTAINING ASBESTOS DOES NOT PRESENT A HAZARD. ONLY WHEN THE ITEM IS SUBJECTED TO ABRASIVE ACTIONS, THEN ASBESTOS FIBERS MAY BE RELEASED AND BECOME AIRBORNE.

FSC: 6810

NIIN: 002815272

Manufacturer's CAGE: 63415

Part No. Indicator: A

Part Number/Trade Name: BENZENE ASTM D 836-84

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General Information

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Item Name: BENZENE, TECHNICAL *

Manufacturer's Name: SPECTRUM CHEMICAL MANUFACTURING CORP. *

Manufacturer's Street: 14422 SOUTH SAN PEDRO *

Manufacturer's P. O. Box:

Manufacturer's City: GARDENA *

Manufacturer's State: CA *

Manufacturer's Country: US *

Manufacturer's Zip Code: 90248-2027 *

Manufacturer's Emerg Ph #: 800-424-9300 *

Manufacturer's Info Ph #: 213-516-8000 *

Distributor/Vendor # 1: CHEMICAL COMMODITIES AGENCY, INC. *

Distributor/Vendor # 1 Cage: 60777 *

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code: C

Safety Focal Point: D

Record No. For Safety Entry: 004

Tot Safety Entries This Stk#: 005

Status: SM *

Date MSDS Prepared: 00DEC93 *

Safety Data Review Date: 05JUL94 *

Supply Item Manager: CX *

MSDS Preparer's Name: C.A.EISENHARD *

Preparer's Company: CHEMICAL COMMODITIES AGENCY INC

Preparer's St Or P. O. Box: 27447 PACIFIC STREET

Preparer's City: HIGHLAND

Preparer's State: CA

Preparer's Zip Code: 92346-2640

Other MSDS Number:

MSDS Serial Number: BLZFG

Specification Number: ASTM D 836-84 *

Spec Type, Grade, Class: TECHNICAL *

Hazard Characteristic Code: F3 *

Unit Of Issue: GL *

Unit Of Issue Container Qty: 1 GAL *

Type Of Container: CAN *

Net Unit Weight: 7.3 LBS *

NRC/State License Number: N/R *

Net Explosive Weight: N/R *

Net Propellant Weight-Ammo: N/R *

Coast Guard Ammunition Code: N/R *

Ingredients/Identity Information

Proprietary: NO *
Ingredient: BENZENE (SARA III) *
Ingredient Sequence Number: 01
Percent: >99 *
Ingredient Action Code: C
Ingredient Focal Point: D
NIOSH (RTECS) Number: CY1400000 *
CAS Number: 71-43-2 *
OSHA PEL: SEE 1910.1028 *
ACGIH TLV: 10 PPM; A2; 9394 *
Other Recommended Limit: NONE SPECIFIED *

Proprietary: NO *
Ingredient: NON-AROMATICS *
Ingredient Sequence Number: 02
Percent: <0.15 *
Ingredient Action Code: C
Ingredient Focal Point: D
NIOSH (RTECS) Number: 1009830NA *
CAS Number: UNKNOWN *
OSHA PEL: NOT ESTABLISHED *
ACGIH TLV: NOT ESTABLISHED *
Other Recommended Limit: NONE RECOMMENDED *

Proprietary: NO *
Ingredient: THIOPHENE *
Ingredient Sequence Number: 03
Percent: <1 *
Ingredient Action Code: C
Ingredient Focal Point: D
NIOSH (RTECS) Number: XM7350000 *
CAS Number: 110-02-1 *
OSHA PEL: NOT ESTABLISHED *
ACGIH TLV: NOT ESTABLISHED *
Other Recommended Limit: NONE RECOMMENDED *

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS TO LIGHT-YELLOW LIQUID WITH AN AROMATIC ODOR. *
Boiling Point: 176F, 80C *
Melting Point: 42.0F, 5.6C *
Vapor Pressure (MM Hg/70 F): 75 @20C *
Vapor Density (Air=1): 2.8 (AIR=1) *
Specific Gravity: 0.8765 *
Decomposition Temperature: UNKNOWN *
Evaporation Rate And Ref: 5.1 (N-BUTYL ACETATE=1) *
Solubility In Water: SLIGHT *
Percent Volatiles By Volume: N/K *
Viscosity: UNKNOWN *
pH: N/R *
Radioactivity: N/R *
Form (Radioactive Matl): N/R *
Magnetism (Milligauss): N/R *

Corrosion Rate (IPY): UNKNOWN *
Autoignition Temperature: 1044F

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Fire and Explosion Hazard Data

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Flash Point: 12F, -11C *
Flash Point Method: CC *
Lower Explosive Limit: 1.2 *
Upper Explosive Limit: 7.8 *
Extinguishing Media: USE WATER SPRAY, CARBON DIOXIDE, REGULAR FOAM, OR DRY CHEMICAL. *
Special Fire Fighting Proc: MOVE CONTAINERS FROM AREA IF W/O RISK. COOL CONTAINER W/WATER. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE, USE UNMANNED HOSE HOLDERS OR WITHDRAW AND LET BURN *
Unusual Fire And Expl Hazrds: WITHDRAW IMMEDIATELY IF CONTAINER IS VENTING, OR DISCOLORED. USE WATER IN FLOODING AMOUNTS AS A FOG. STREAM MAY SPREAD FIRE. AVOID BREATHING HAZARDOUS MATERIAL. *

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Reactivity Data

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Stability: YES *
Cond To Avoid (Stability): AVOID CONTACT WITH HEAT, SPARKS, FLAMES AND OTHER SOURCES OF IGNITION *
Materials To Avoid: ACIDS, CHLORINE, NITRIC ACID, PERCHLORATES, URANIUM HEXAFLUORIDE *
Hazardous Decomp Products: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE OXIDES OF CARBON. *
Hazardous Poly Occur: NO *
Conditions To Avoid (Poly): NOT RELEVANT *

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Health Hazard Data

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LD50-LC50 Mixture: ORAL RAT LD50: UNKNOWN *
Route Of Entry - Inhalation: YES *
Route Of Entry - Skin: YES *
Route Of Entry - Ingestion: YES *
Health Haz Acute And Chronic: TARGET EFFECTS: CNS DEPRESSANT. BONE MARROW DEPRESSANT. MAY AFFECT IMMUNE SYSTEM AND HEART. LOCAL EFFECTS: RESPIRATORY IRRITATION, PULMONARY EDEMA, HEADACHE, DIZZINESS, WEAKNESS. DEATH DUE TO ASPHYXIA. CNS DEPRESSION, CARDIAC OR RESPIRATORY FAILURE. *
Carcinogenicity - NTP: YES *
Carcinogenicity - IARC: YES *
Carcinogenicity - OSHA: YES *
Explanation Carcinogenicity: CONTAINS BENZENE [71-43-2] WHICH IS LISTED BY NTP AND IARC AND REGULATED BY OSHA AS A CARCINOGEN (CAUSES LEUKEMIA.) *
Signs/Symptoms Of Overexp: DEATH FROM CIRCULATORY COLLAPSE & VENTRICULAR FIBRILLATION. CHRONIC: INHALATION: SYMPTOMS OF CNS HEMATOPIETIC & IMMUNE SYSTEMS. SKIN: BURNS, BLISTERS, EDEMA. CHRONIC: CONJUNCTIVITIS. INGESTION: NAUSEA VOMITING, SHALLOW RESPIRATION, DEATH FROM 10-15 ML. SINGLE EXPOSURE: LONG TERM EFFECTS POSSIBLY W/PANCYTOPENIA PERSISTING *
Med Cond Aggravated By Exp: PERSONS W/CERTAIN IMMUNOLOGICAL TENDENCIES, POOR NUTRITION, ANEMIA, DRUG OR CHEMICALLY INDUCED AGRANULOCYTEamia. *
Emergency/First Aid Proc: EYE: FLUSH W/WATER OR NORMAL SALINE, 15 MIN, HOLD LIDS OPEN. SKIN: WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE. INHALATION: REMOVE TO FRESH AIR. AID/RESTORE BREATHING IF NECESSARY. INGESTED: DO NOT INDUCE VOMITING. PREVENT ASPIRATION. GET IMMEDIATE MEDICAL CARE. *

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: ELIMINATE IGNITION SOURCES. USE WATER TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL. PLACE INTO CONTAINERS FOR DISPOSAL. SOIL SPILL: DIG HOLDING AREA. PREVENT IGNITION. WATER SPILL: APPLY DETERGENTS, SOAPS, ALCOHOLS, TO THE SPILL *

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER. *

Waste Disposal Method: USE DREDGES TO EXTRACT IMMOBILIZED MASSES OF POLLUTION. OBSERVE ALL FEDERAL, STATE & LOCAL REGULATIONS WHEN STORING AND DISPOSING OF THIS SUBSTANCE. CONTACT THE "EPA". *

Precautions-Handling/Storing: STORE IN CONTAINERS MEETING NFPA 77-1983. PROTECT FROM DAMAGE. OUTSIDE STORAGE IS PREFERRABLE. INSIDE STORAGE SHOULD BE IN FLAMM. LIQUID STORAGE ROOM *

Other Precautions: VAPORS MAY BE EXPLOSIVE. CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OR FIRE. AVOID CONTAMINATION OF WATER SOURCES. *

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Control Measures

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Respiratory Protection: BASED ON CONTAMINATION LEVELS IN THE WORK PLACE. FOR EXAMPLE 1/2 MASK PURIFYING RESPIRATOR W/ORGANIC VAPOR CARTRIDGE. SUPPLIED AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE. *

Ventilation: VENTILATION SHOULD MEET THE REQUIREMENTS SET FORTH IN 29CFR1910.1028(F). *

Protective Gloves: IMPERVIOUS GLOVES *

Eye Protection: SPLASH PROOF - DUST RESISTANT GOGGLES *

Other Protective Equipment: IMPERVIOUS CLOTHING. *

Work Hygienic Practices: EYE WASH STATION AND SAFETY SHOWER, *

Suppl. Safety & Health Data: NONE *

Hazardous Poly Occur: NO
Conditions To Avoid (Poly): N/K

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Health Hazard Data

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LD50-LC50 Mixture: LD50, (ORAL) RATS - 2910 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALATION: MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, LOSS OF CONSCIOUSNESS. EYE CONTACT: MAY CAUSE SEVERE IRRITATION OR BURNS. SKIN CONTACT: MAY CAUSE SEVERE IRRITATION OR BURNS. INGESTION: MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity:
Signs/Symptoms Of Overexp: MAY INCLUDE DAMAGE TO KIDNEYS, LIVER, LUNGS, BLOOD, OR CENTRAL NERVOUS SYSTEM. PROLONGED SKIN CONTACT MAY CAUSE DERMATITIS.
Med Cond Aggravated By Exp: NONE IDENTIFIED
Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN. EYE CONTACT: FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES. CALL A PHYSICIAN. SKIN CONTACT: FLUSH SKIN WITH PLENTY OF WATER FOR 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. CALL A PHYSICIAN.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF IT CAN BE DONE WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPOR. REPORTABLE QUANTITY- 100LBS.
Neutralizing Agent:
Waste Disposal Method: CONSULT YOUR LOCAL ENVIRONMENTAL OFFICER. DISPOSE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE.
Other Precautions: WASH THOROUGHLY AFTER HANDLING. AVOID SKIN, EYES & CLOTHING CONTACT. NO SMOKING IN THE AREA.

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Control Measures

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Respiratory Protection: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEED TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, SCBA IS RECOMMENDED.
Ventilation: GENERAL OR LOCAL EXHAUST VENTILATION.
Protective Gloves: VITON GLOVES
Eye Protection: GOGGLES/FACE SHIELD
Other Protective Equipment: FULL PROTECTIVE CLOTHING, SAFETY SHOWER, EYE WASH STATION
Work Hygienic Practices: WASH CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: REPORTABLE QUANTITY IS 100LBS.

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

316111

FSC: 6810

NIIN: 00N010656

Manufacturer's CAGE: 54968

Part No. Indicator: A

Part Number/Trade Name: BENZO(A)ANTHRACENE 0.1G,48563

=====

General Information

=====

Item Name:

Manufacturer's Name: SUPELCO, INC.

Manufacturer's Street: SUPELCO PARK

Manufacturer's P. O. Box:

Manufacturer's City: BELLEFONTE

Manufacturer's State: PA

Manufacturer's Country:

Manufacturer's Zip Code: 16823-0048

Manufacturer's Emerg Ph #: 814-359-3441

Manufacturer's Info Ph #: 814-359-3441

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status:

Date MSDS Prepared: 16MAY85

Safety Data Review Date: 15JUL89

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BHYRL

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code:

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

316112

=====

Ingredients/Identity Information

=====

Proprietary: NO
Ingredient: BENZ~A|ANTHRACENE (SARA III)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: CV9275000
CAS Number: 56-55-3
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: A2 ; 9394
Other Recommended Limit: N/K (FP N/ORNL)

=====

Physical/Chemical Characteristics

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Appearance And Odor: PALE YELLOW CRYSTAL.
Boiling Point: 438C, 820F
Melting Point: 157C, 315F
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: N/A
Decomposition Temperature: N/K (FP N)
Evaporation Rate And Ref: N/A
Solubility In Water: N/A
Percent Volatiles By Volume: N/A
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: N/K (FP N/ORNL)
Flash Point Method: N/K
Lower Explosive Limit: N/K (FP N)
Upper Explosive Limit: N/K (FP N)
Extinguishing Media: CO*2, FOAM, DRY CHEMICAL.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL
PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: N/A

=====

Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): N/A
Materials To Avoid: OXIDIZING AGENTS.
Hazardous Decomp Products: N/A
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): N/A

Health Hazard Data

LD50-LC50 Mixture: N/A

Route Of Entry - Inhalation: NO

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: SEE SIGNS AND SYMPTOMS OF OVEREXPOSURE.

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: SUSPECTED HUM CARCIN/KNOWN ANIM CARCIN (NTP 1985).INADEQ EVID FOR CARC IN HUM,SUFF EVID FOR CARC IN ANIMALS (IARC 1987)

Signs/Symptoms Of Overexp: EYES/SKIN/INGESTION/INHALATION:N/K (FP N/ORNL).

Med Cond Aggravated By Exp: N/K (FP N/ORNL)

Emergency/First Aid Proc: EYES:FLUSH WITH WATER FOR AT LEAST 15 MINUTES.SKIN:FLUSH WITH LARGE VOLUMES OF WATER.REMOVE CONTAMINATED CLOTHING.INGESTION:CONTACT PHYSICIAN.INHALATION:IMMEDIATELY MOVE TO FRESH AIR.GIVE OXYGEN IF BREATHING IS LABORED.IF BREATHING STOPS,GIVE ARTIFICIAL RESPIRATION.CONTACT PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SWEEP UP MATERIAL.VENTILATE AREA.AVOID GENERATING DUST.

Neutralizing Agent: N/K (FP N/ORNL)

Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL,STATE AND LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: STORE IN SEALED CONTAINER IN COOL,DRY LOCATION.KEEP AWAY FROM OXIDIZERS.AVOID GENERATING DUST.

Other Precautions: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation: LOCAL AND GENERAL VENTILATION NECESSARY TO KEEP AIR CONCENTRATION BELOW LEVEL OF CONCERN (FP N/ORNL).

Protective Gloves: RUBBER

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: N/A

Work Hygienic Practices: N/K (FP N/ORNL)

Suppl. Safety & Health Data: ROUTES OF ENTRY:INHALATION/SKIN/INGESTION (FP N).

DOD Hazardous Materials Information System
DoD 6050.5-LR
AS OF August 1994

316114

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 00N010749

Manufacturer's CAGE: 54968

Part No. Indicator: A

Part Number/Trade Name: BENZO-A-PYRENE 0.1G.CATALOG NO 48564.

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General Information
=====

Item Name:

Manufacturer's Name: SUPELCO, INCO

Manufacturer's Street: SUPELCO PARK

Manufacturer's P. O. Box:

Manufacturer's City: BELLEFONTE

Manufacturer's State: PA

Manufacturer's Country:

Manufacturer's Zip Code: 16823-0048

Manufacturer's Emerg Ph #: 814-359-3441

Manufacturer's Info Ph #: 814-359-3441

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 10MAR88

Safety Data Review Date: 01MAR89

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BHHL5

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code:

Unit Of Issue: NK

Unit Of Issue Container Qty: N/K

Type Of Container: N/K

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO
Ingredient: BENZO~A|PYRENE (SARA III)
Ingredient Sequence Number: 01
Percent: </0.1
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: DJ3675000
CAS Number: 50-32-8
OSHA PEL: 0.2 MG/M3
ACGIH TLV: A2, MG/M3;9394
Other Recommended Limit: N/K FPN

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Physical/Chemical Characteristics

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Appearance And Odor: YELLOWISH SOLID.
Boiling Point: 923 F;495 C
Melting Point: 347 F;175 C
Vapor Pressure (MM Hg/70 F): N/A MFR
Vapor Density (Air=1): N/A MFR
Specific Gravity: N/A MFR
Decomposition Temperature:
Evaporation Rate And Ref: N/A MFR
Solubility In Water: N/A MFR
Percent Volatiles By Volume: N/AMFR
Viscosity:
pH: N.KFPN
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K FPN
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: N/K FPN
Flash Point Method: N/KFPN
Lower Explosive Limit: N/K FPN
Upper Explosive Limit: N/K FPN
Extinguishing Media: WATER,CO*2, DRY CHEMICAL.
Special Fire Fighting Proc: WEAR SELF CONTAINED BREATHING APPARATUS WHEN
FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL
PROTECTIVE EQUIPMENT(FPN).
Unusual Fire And Expl Hazrds: N/A(MFR)

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Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): N/A MFR
Materials To Avoid: OXIDIZING AGENTS,ALLYL CHLORIDE INORGANIC & ORGANIC
ACIDS,MESITYL OXIDE,PERCHLORATE SALTS,VINYL ACETATE,(SEE SUP DATA).
Hazardous Decomp Products: N/A MFR
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): WILL NOT OCCUR.

Health Hazard Data

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LD50-LC50 Mixture: LD50 50 MG/KG SUBCUTANEOUS RAT
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: SEE SIGNS & SYMPTOMS OF OVEREXPOSURE.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: BENZO(CA)PYRENE:NTP ANTICIPATED HUMAN
CARCINOGEN.ACGIH,SUSPECTED HUMAN CARC(FPN).REPORTED ANIMAL CARCINOGEN (MFR)

Signs/Symptoms Of Overexp: MAY IRRITATE EYES AND/OR SKIN;IRRITATES
RESPIRATORY TRACT;IRRITATES SKIN,BURNS SKIN.REPORTED ANIMAL CARCINOGEN.
Med Cond Aggravated By Exp: N/K FPN
Emergency/First Aid Proc: EYES:FLUSH WITH PLENTY OF POTABLE WATER AT LEAST
15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN;FLUSH SKIN W/
LARGE VOLUMES OF WATER,REMOVE CONTAMINATED CLOTHING,INHALATION: IMMEDIATELY
MOVE TO FRESH AIR(MFR).SUPPORT BREATHING(GIVE O*2/ARTIFICIAL
RESPIRATION)(FPN).INGESTION:CONTACT A PHYSICIAN.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: TAKE UP WITH ABSORBENT MATERIAL.VENTILATE
AREA.FLUSH AREA WITH WATER.
Neutralizing Agent: N/K FPN
Waste Disposal Method: COMPLY WITH ALL APPLICABLE FEDERAL,STATE,OR LOCAL
REGULATIONS.
Precautions-Handling/Storing: STORE IN SEALED CONTAINER INM COOL,DRY
LOCATION.KEEP AWAY FROM IGNITION SOURCES.STORE UNDER NITROGEN.
Other Precautions: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

=====

Control Measures

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Respiratory Protection: WEAR SELF CONTAINED BREATHING APPARATUS(MFR).
NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FPN).
Ventilation: USE ONLY IN EXHAUST HOOD.
Protective Gloves: WEAR RUBBER GLOVES.
Eye Protection: CHEMICAL WORKER GOGGLES(FPN).
Other Protective Equipment: N/A.
Work Hygienic Practices: OBSERVE GOOD WORK HYGIENE PRACTICES(FPN).
Suppl. Safety & Health Data: MATERIALS TO AVOID:PROPIOLACTONE,
CHLOROHYDRINS.

316117

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6850

NIIN: 00N011600

Manufacturer's CAGE: 0B2S2

Part No. Indicator: A

Part Number/Trade Name: DI(2-ETHYLHEXYL) PHTHALATE

General Information

Item Name:

Manufacturer's Name: ARISTECH CHEMICAL CORPORATION (WAS USS CHEMICALS)

Manufacturer's Street: 600 GRANT STREET

Manufacturer's P. O. Box:

Manufacturer's City: PITTSBURGH

Manufacturer's State: PA

Manufacturer's Country: US

Manufacturer's Zip Code: 15230-0250

Manufacturer's Emerg Ph #: 412-433-7654 (8-5,M-F); (SEE SUPP)

Manufacturer's Info Ph #: 412-433-7654;413-433-2747

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 01FEB89

Safety Data Review Date: 01MAR90

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BJFJB

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code:

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: DI-SEC-OCTYL PHTHALATE (DI-2-ETHYLHEXYL-PHTHALATE) (SARA III)
Ingredient Sequence Number: 01
Percent: 100
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: TI0350000
CAS Number: 117-81-7
OSHA PEL: 5 MG/M3/10 STEL
ACGIH TLV: 5 MG/M3; 9192
Other Recommended Limit: N/K (FP N/ORNL)

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR LIQUID WITH A MILD ODOR.
Boiling Point: 446F, 230C
Melting Point: N/A
Vapor Pressure (MM Hg/70 F): SEE SUPP
Vapor Density (Air=1): 13.5, AIR=1
Specific Gravity: 0.982 (WATER=1)
Decomposition Temperature: N/K (FP N)
Evaporation Rate And Ref: N/K (FP N/ORNL)
Solubility In Water: 0.02%
Percent Volatiles By Volume: NEGLIG
Viscosity:
pH: N/A
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: 420F, 216C
Flash Point Method: COC
Lower Explosive Limit: N/K
Upper Explosive Limit: N/K (FP N)
Extinguishing Media: USE CARBON DIOXIDE, FOAM, DRY CHEMICAL, OR WATER FOG.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). BURNING OF THE PRODUCT WILL RESULT IN THE RELEASE OF TOXIC FUMES.
Unusual Fire And Expl Hazrds: NONE. HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, ORGANIC ACID.

=====

Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): NONE
Materials To Avoid: NITRATES, STRONG OXIDIZERS, STRONG ACIDS, STRONG ALKALIES.
Hazardous Decomp Products: CARBON MONOXIDE, CARBON DIOXIDE, ORGANIC ACID.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

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Health Hazard Data

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LD50-LC50 Mixture: N/K (FP N/ORNL)

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: MAJOR TARGET ORGANS SHOWING DEHP (DI(2-ETHYLHEXYL PHTHALATE)) TOXICITY IN ANIMALS ARE THE LIVER, TESTES. DEHP CAUSES LIVER ENLARGEMENT, PEROXISOME PROLIFERATION IN RODENTS; TESTICULAR DMG, REDUCED FERTILITY IN MALES; FETOTOXICITY, TERATOGENICITY IN PREGNANT FEMALE RODENTS. THE LIVER CHANGES MAY BE UNIQUE TO RODENTS (MFR).

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: DEHP: NO ADEQ DATA TO ALLOW EVALUATION OF CARC IN HUMANS; SUFF EVID FOR CARC IN ANIM (IARC, 1987). SUSP HUMAN CARC/(SUP DAT)

Signs/Symptoms Of Overexp: EYES: LIQ/MIST EXPOS MAY PRODUCE AT LEAST MILD IRRIT. SKIN: EXCESS CONTACT MAY PRODUCE AT LEAST MILD IRRIT. INGEST: POSS NAUSEA, VOMIT, DIARRHEA. INHAL: DUE TO LOW VAP PRESS, INHAL POTENTIAL REGARDED AS LOW. IF PRODUCT IS HEATED/MISTED/SPRAYED, CONC ABOVE REC EXPOS LIMIT MAY CAUSE IRRIT TO MUCOUS MEMBRANES, UPPER RESP TRACT.

Med Cond Aggravated By Exp: INDIVIDUALS WITH CHRONIC RESPIRATORY DISORDERS (ASTHMA, CHRONIC BRONCHITIS, EMPHYSEMA, ETC) MAY BE ADVERSELY AFFECTED BY ANY FUME OR AIRBORNE PARTICULATE MATTER EXPOSURE.

Emergency/First Aid Proc: EYES: FLUSH W/ LARGE QUANTITIES OF WATER FOR AT LEAST 15 MIN, LIFT LOWER & UPPER LIDS OCCAS. SEEK MEDICAL AID. SKIN: REMOVE CONTAM CLOTHING. WASH SKIN THOROUGHLY W/ SOAP & WATER. SEEK MEDICAL AID. INGEST: GIVE 1-2 LARGE GLASSES OF WATER OR MILK. INDUCE VOMITING. SEEK MEDICAL AID. INHAL: REMOVE FROM EXPOSURE. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTF RESP OR OXYGEN AS INDICATED. SEEK MEDICAL AID.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: AVOID EXCESS BRTHG OF FUMES WHEN IN CONTACT W/ HOT OBJECTS. REMOVE IGNIT SOURCES. COVER W/ EXCESS OF ABSORB INORG MATL (VERMICULITE). SWEEP UP, PLACE IN LABELLED DRUM. CERCLA HAZ SUBSTANCE. REPORT SPILLS TO NATIONAL RESPONSE CENTER (800-424-8802).

Neutralizing Agent: N/K (FP N/ORNL)

Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N). FOR HAZARDOUS WASTE REGULATIONS CALL RCRA HOTLINE (800-424-9346). DI(2-ETHYLHEXYL)PHTHALATE IS IDENTIFIED AS SARA TOXIC CHEMICAL.

Precautions-Handling/Storing: STORE IN WELL-VENTILATED AREA AWAY FROM OXIDIZING AGENTS & SOURCES OF HEAT/IGNITION. DO NOT EAT OR SMOKE IN AREAS WHERE MATERIAL IS USED OR STORED.

Other Precautions: FOLLOW GOOD HYGIENIC PRACTICES TO AVOID POTENTIAL CHRONIC EFFECTS. WEAR CLEAN WORK CLOTHING. AVOID REPEATED OR PROLONGED CONTACT WITH LIQUID AND INHALATION OF MISTS OR VAPORS.

=====

Control Measures

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Respiratory Protection: RESPIRATORY PROTECTION APPROVED BY NIOSH/MSHA FOR PROTECTION AGAINST ORGANIC VAPORS SHOULD BE USED TO AVOID INHALATION OF EXCESSIVE AIR CONTAMINANTS. APPROPRIATE RESPIRATOR SELECTION DEPENDS ON THE TYPE AND MAGNITUDE OF EXPOSURE.

Ventilation: USE LOC EXHAUST VENT TO CONTROL AIR CONTAMINANT EMISSION. USE

GEN DILUTION VENT TO ASSIST W/ AIR CONTAM CONC REDUCTION.

Protective Gloves: NATURAL RUBBER, NEOPRENE, PC, NITRILE.

Eye Protection: CHEM SFTY GOG REQ; FACESHLD FOR SPLASHES.

Other Protective Equipment: EMERGENCY EYE WASH STATIONS & DELUGE SAFETY SHOWERS SHOULD BE AVAILABLE. NATURAL RUBBER, NEOPRENE, PC, NITRILE PROT GARMENT.

Work Hygienic Practices: FOLLOW GOOD HYGIENIC PRACTICES.

Suppl. Safety & Health Data: EMER TEL NO: 412-433-5811 (OFF HOUR EMERGENCIES). VAPOR PRESSURE: NEGLIGIBLE @ 0C, 32F. ROUTES OF ENTRY: EYES (MFR), INHALATION/INGESTION (FP N). EXPLAN OF CARCIN: KNOWN ANIMAL CARCIN (NTP, 1989). KNOWN TO CAUSE CANCER (CAL PROP 65, 1988).

DOD Hazardous Materials Information System

316121

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 009825125

Manufacturer's CAGE: 3D869

Part No. Indicator: A

Part Number/Trade Name: CHROMIUM (III) OXIDE

General Information

Item Name: CHROMIUM OXIDE, REAGENT

Manufacturer's Name: SHAPE PRODUCTS

Manufacturer's Street: 1127 57TH AVE.

Manufacturer's P. O. Box:

Manufacturer's City: OAKLAND

Manufacturer's State: CA

Manufacturer's Country: US

Manufacturer's Zip Code: 94621-4427

Manufacturer's Emerg Ph #: 415-534-1186

Manufacturer's Info Ph #: 415-534-1186

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 003

Tot Safety Entries This Stk#: 004

Status: SP

Date MSDS Prepared: 31JAN92

Safety Data Review Date: 31JAN92

Supply Item Manager: CX

MSDS Preparer's Name: DGSC-SSH

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BLWCK

Specification Number: NONE

Spec Type, Grade, Class: REAGENT GRADE

Hazard Characteristic Code: N1

Unit Of Issue: LB

Unit Of Issue Container Qty: 1

Type Of Container: BOTTLE

Net Unit Weight: 1 LBS

NRC/State License Number: N/R

Net Explosive Weight: N/R

Net Propellant Weight-Ammo: N/R

Coast Guard Ammunition Code: N/R

316122

Ingredients/Identity Information

Proprietary: NO
Ingredient: CHROMIUM OXIDE
Ingredient Sequence Number: 01
Percent: 99+
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: GB6475000
CAS Number: 1308-38-9
OSHA PEL: 0.5 MG(CR)/M3
ACGIH TLV: 0.5 MG(CR)/M3 9192
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: BRIGHT GREEN, EXTREMELY HARD CRYSTALS. NO ODOR
Boiling Point: 7232F, 4000C
Melting Point: 4415F, 2435C
Vapor Pressure (MM Hg/70 F): 0
Vapor Density (Air=1): NIL
Specific Gravity: 5.04
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 0
Solubility In Water: APPRECIABLE
Percent Volatiles By Volume: 0
Viscosity: N/R
pH: N/R
Radioactivity: N/R
Form (Radioactive Matl): N/R
Magnetism (Milligauss): N/R
Corrosion Rate (IPY): N/R
Autoignition Temperature: NONE

Fire and Explosion Hazard Data

Flash Point: NONE
Flash Point Method: N/R
Lower Explosive Limit: NONE
Upper Explosive Limit: NONE
Extinguishing Media: NONCOMBUSTIBLE. USE MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Special Fire Fighting Proc: NOT APPLICABLE
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: MOISTURE, GLYCEROL, OXYGEN DIFLUORIDE AND LITHIUM
Hazardous Decomp Products: TOXIC FUMES
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

316123

LD50-LC50 Mixture: TLV-TWA 500 UG(CR)/M3

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: CAUSES IRRITATION. MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: IARC STUDIES: ANIMAL INDEFINITE

Signs/Symptoms Of Overexp: CAUSES IRRITATION. MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION.

Med Cond Aggravated By Exp: PERSONS WITH A HISTORY OF AILMENTS OR WITH A PRE-EXISTING DISEASE INVOLVING THE LUNGS MAY BE AT INCREASED RISK FROM EXPOSURE.

Emergency/First Aid Proc: EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION IMMEDIATELY. SKIN: WASH WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. GET MEDICAL ADVICE. INHALATION: REMOVE TO FRESH AIR. GIVE MOUTH-TO-MOUTH RESUSCITATION IF NOT BREATHING. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. RINSE MOUTH & DRINK LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: VENTILATE AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE. SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. WEAR RESPIRATOR, CHEMICAL SAFETY GOGGLES, RUBBER BOOTS AND HEAVY RUBBER GLOVES AS REQUIRED.

Neutralizing Agent: NONE NORMALLY REQUIRED.

Waste Disposal Method: BURY IN A LANDFILL SITE APPROVED FOR THE DISPOSAL OF CHEMICAL AND HAZARDOUS WASTE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions-Handling/Storing: USE ONLY IN A CHEMICAL FUME HOOD. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. DO NOT BREATHE DUST. KEEP CONTAINER TIGHTLY CLOSED: HYGROSCOPIC.

Other Precautions: USE OSHA/MSHA APPROVED RESPIRATOR IN NON-VENTILATED AREAS AND/OR FOR EXPOSURE ABOVE THE TLV.

Control Measures

Respiratory Protection: WEAR A NIOSH/MSHA APPROVED CHEMICAL CARTRIDGE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

Ventilation: LOCAL AND MECHANICAL(GENERAL) EXHAUST TO PROVIDE ADEQUATE VENTILATION.

Protective Gloves: NEOPRENE GAUNTLET RUBBER GLOVES

Eye Protection: SAFETY GLASSES - CHEMICAL SPLASH GOGGLES

Other Protective Equipment: WEAR INDUSTRIAL WORK CLOTHING. USE RUBBER APRON OR BOOTS IF NEEDED. HAVE EMERGENCY EYE WASH AND SAFETY SHOWER AVAILABLE.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING AND BEFORE EATING, DRINKING OR SMOKING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Suppl. Safety & Health Data: AVOID PROLONGED OR REPEATED EXPOSURE. DO NOT

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GET ON SKIN OR IN EYES. DO NOT BREATHE VAPORS OR MIST. DO NOT INGEST. READ
PRECAUTIONS ON LABEL BEFORE USE.

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6850

NIIN: 00N032521

Manufacturer's CAGE: 54968

Part No. Indicator: A

Part Number/Trade Name: 48512, 1,1-DICHLOROETHANE 5G

=====

General Information

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Item Name:

Manufacturer's Name: SUPELCO INC

Manufacturer's Street: SUPELCO PARK

Manufacturer's P. O. Box:

Manufacturer's City: BELLEFONTE

Manufacturer's State: PA

Manufacturer's Country: US

Manufacturer's Zip Code: 16823-0048

Manufacturer's Emerg Ph #: 814-359-3441

Manufacturer's Info Ph #: 814-359-3441

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 18FEB86

Safety Data Review Date: 17JUL92

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BPNCB

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: NK

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

=====Ingredients/Identity Information=====

Proprietary: NO
Ingredient: P-DIOXANE; (DIOXANE). LD50: (ORAL,RAT) 4200 MG/KG
Ingredient Sequence Number: 01
Percent: 3
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: JG8225000
CAS Number: 123-91-1
OSHA PEL: S, 100 PPM
ACGIH TLV: S, 25 PPM; 9293
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ETHANE, 1,1-DICHLORO- (SARA III). LD50: (ORAL,RAT) 725 MG/KG
Ingredient Sequence Number: 02
Percent: 97
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: KI0175000
CAS Number: 75-34-3
OSHA PEL: 100 PPM
ACGIH TLV: 200 PPM;250 STEL
Other Recommended Limit: N/K
=====

Physical/Chemical Characteristics

=====Appearance And Odor: COLORLESS LIQUID, CHLOROFORM-LIKE ODOR.
Boiling Point: 135F,57C
Melting Point: -143F,-97C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.777 (H*20=1)
Decomposition Temperature: N/K
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: NOT APPLICABLE
Percent Volatiles By Volume: N/A
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:
=====

Fire and Explosion Hazard Data

=====Flash Point: 17.0F,-8.3C
Flash Point Method: N/K
Lower Explosive Limit: 6%
Upper Explosive Limit: 16%
Extinguishing Media: WATER, CO*2, DRY CHEMICAL, ALCOHOL FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA
AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: VAPS FORM EXPLO MIX W/AIR. FOLLOWING TOX
=====

VAPS ARE FORMED WHEN MATL IS HEATED TO DECOMP: HCL GAS & PHOSGENE GAS.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): WELL RELEASE FLAMMABLE AND TOXIC ACETALDEHYDE GAS ON CONTACT WITH STRONG CAUSTIC.

Materials To Avoid: OXIDIZERS, CAUSTIC.

Hazardous Decomp Products: HYDROGEN CHLORIDE GAS AND PHOSGENE GAS.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50: (ORAL,RAT) 725 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: HARMFUL IF ABSORBED THRU SKIN. HARMFUL IF INHALED/SWALLOWED. IRRIT SKIN. DERMATITIS. DEPRESSES CNS. NARCOSIS. LIVER & KIDNEY DMG. CHLOROCARBON MATLS HAVE PRODUCED SENSIT OF THE MYOCARDIUM TO EPINEPHRINE IN LABORATORY ANIMALS & COULD HAVE A SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEHPRINE) (EFTS OF OVEREXP)

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: P-DIOXANE: (IARC) GROUP 2B, (NTP) ANTICIPATED TO BE A CARCINOGEN.

Signs/Symptoms Of Overexp: HLTH HAZ: MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHORNICALLY EXPOSED TO CHLOROCARBONS (FP N).

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYES: FLUSH EYES WITH WATER FOR AT LEAST 15 MIN. SKIN: FLUSH SKIN WITH LARGE VOLUMES OF WATER. REMOVE CONTAMINATED CLOTHING. INHAL: IMMEDIATELY MOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING IS LABORED. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. CONTACT A PHYSICIAN. INGEST: GET MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP WITH ABSORBENT MATERIAL. VENTILATE AREA. FLUSH AREA WITH WATER.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.

Precautions-Handling/Storing: STORE IN SEALED CONTAINER IN COOL, DRY LOCATION. KEEP AWAY FROM IGNITION SOURCES. STABILIZED WITH 3% DIOXANE, A RECOGNIZED CARCINOGEN.

Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN THE GENERAL VICINITY OF ARC WELING, OPEN FLAMES OR HOT SURFACES. HEAT AND/OR UV RADIATION MAY CAUSE THE FORMATION OF HCL AND/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED SCBA.

Ventilation: USE ONLY IN WELL VENTILATE AREA.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

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Other Protective Equipment: NOT APPLICABLE

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

316129

Proprietary Version - For U.S. Government Use Only

FSC: 6850

NIIN: 00N003073

Manufacturer's CAGE: 89138

Part No. Indicator: A

Part Number/Trade Name: FORMULA 3371X

General Information

Item Name:

Manufacturer's Name: ALLIED-KELITE PRODUCTS

Manufacturer's Street:

Manufacturer's P. O. Box:

Manufacturer's City:

Manufacturer's State:

Manufacturer's Country:

Manufacturer's Zip Code:

Manufacturer's Emerg Ph #: 213-222-0201

Manufacturer's Info Ph #:

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status:

Date MSDS Prepared: PRE-HCS

Safety Data Review Date: 04MAY84

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BCJKH

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code:

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number: N/A

Net Explosive Weight:

Net Propellant Weight-Ammo: N/A

Coast Guard Ammunition Code:

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Ingredients/Identity Information

Proprietary: NO
Ingredient: 1,2-DICHLOROETHYLENE (SARA III)
Ingredient Sequence Number: 01
Percent: 60
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: KV9360000
CAS Number: 540-59-0
OSHA PEL: 200 PPM
ACGIH TLV: 200 PPM; 9192
Other Recommended Limit:

Proprietary: NO
Ingredient: PHENOL
Ingredient Sequence Number: 02
Percent:
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: SJ3325000
CAS Number: 108-95-2
OSHA PEL: S, 5 PPM
ACGIH TLV: S, 5 PPM; 8990
Other Recommended Limit:

Proprietary: NO
Ingredient: FORMIC ACID (SARA III)
Ingredient Sequence Number: 03
Percent: <10
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: LQ4900000
CAS Number: 64-18-6
OSHA PEL: 5 PPM
ACGIH TLV: 5 PPM/10 STEL; 9192
Other Recommended Limit:

Proprietary: NO
Ingredient: AROMATICSOLVENT (CYCLO SOL 28) CHEMICAL INGREDIENTS UNK
Ingredient Sequence Number: 04
Percent: 10
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 1000007AH
CAS Number:
OSHA PEL:
ACGIH TLV:
Other Recommended Limit:

Physical/Chemical Characteristics

Appearance And Odor: BROWN LIQUID, PHENOLIC ODOR.
Boiling Point: 100F; 38C
Melting Point:
Vapor Pressure (MM Hg/70 F): >1

Vapor Density (Air=1): >1
Specific Gravity: 1.150
Decomposition Temperature:
Evaporation Rate And Ref:
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: 70
Viscosity:

pH:
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY):
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

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Flash Point: NONE TO BOILING
Flash Point Method:
Lower Explosive Limit:
Upper Explosive Limit:
Extinguishing Media: WILL NOT SUPPORT COMBUSTION.
Special Fire Fighting Proc: TREAT AS CHEMICAL FIRE.PRESS-DEMAND SCBA, FULL
PROTECT CLTHNG
Unusual Fire And Expl Hazrds: MAY PRODUCE PHOSGENE UPON DIRECT CONTACT W/
FLAMES & POSSIBLY HCL.

=====

Reactivity Data

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Stability: YES
Cond To Avoid (Stability):
Materials To Avoid: STRONG OXIDIZERS.
Hazardous Decomp Products: PHOSGENE, HCL
Hazardous Poly Occur: NO
Conditions To Avoid (Poly):

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Health Hazard Data

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LD50-LC50 Mixture:
Route Of Entry - Inhalation:
Route Of Entry - Skin:
Route Of Entry - Ingestion:
Health Haz Acute And Chronic:
Carcinogenicity - NTP:
Carcinogenicity - IARC:
Carcinogenicity - OSHA:
Explanation Carcinogenicity:
Signs/Symptoms Of Overexp: MAY PRODUCE IRRITATION TO EYES AND RESPIRATORY
TRACT.
Med Cond Aggravated By Exp:
Emergency/First Aid Proc: REMOVE TO FRESH AIR. EYES:FLUSH W/WATER 15 MINS.
CALL MD.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: FLUSH TO SEWER W/ WATER.
Neutralizing Agent:
Waste Disposal Method: MFR RECOMMENDS TO DISPOSE SIMILAR TO SOLVENTS AND

OILS. DISPOSAL METHOD MUST BE IAW FEDERAL, STATE AND LOCAL REGULATIONS.

Precautions-Handling/Storing: DO NOT STORE IN DIRECT SUNLIGHT OR AT ELEVATED TEMPERATURES. NO SMOKING IN AREA OF USE. HEAT &/OR UV RADIATION MAY CAUSE HCL &/OR PHOSGENE TO FORM.

Other Precautions: DO NOT TAKE INTERNALLY. AVOID CONTACT W/ SKIN, EYES AND CLOTHING. DO NOT USE IN THE GENERAL VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFACES.

=====
Control Measures
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Respiratory Protection: USE NIOSH/MSHA APPRVD RESPIRATOR IF REQUIRED

Ventilation: USE ADEQUATE VENT TO KEEP BELOW TLV.

Protective Gloves: RECOMMENDED

Eye Protection: GOGGLES

Other Protective Equipment: APRONS

Work Hygienic Practices:

Suppl. Safety & Health Data: ACCORDING TO MFR THIS PRODUCT WAS DEEMED OBSOLETE IN 1974.

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DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 9140

NIIN: 00B030052

Manufacturer's CAGE: 58326

Part No. Indicator: A

Part Number/Trade Name: NO. 1 DIESEL FUEL/NO. 1 FUEL OIL

General Information

Item Name: N/K

Manufacturer's Name: CONOCO INC.

Manufacturer's Street: N/K

Manufacturer's P. O. Box: 2197

Manufacturer's City: HOUSTON

Manufacturer's State: TX

Manufacturer's Country: US

Manufacturer's Zip Code: 77252

Manufacturer's Emerg Ph #: 713-293-5550

Manufacturer's Info Ph #: 713-293-5550

Distributor/Vendor # 1: N/K

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: B

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status:

Date MSDS Prepared: 00DEC88

Safety Data Review Date: 14APR89

Supply Item Manager:

MSDS Preparer's Name: N/K

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BGSZJ

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code:

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: HYDROCARBONS (AROMATIC & PARAFFINIC)
Ingredient Sequence Number: 01
Percent: >90
Ingredient Action Code:
Ingredient Focal Point: B
NIOSH (RTECS) Number: 1000007AH
CAS Number: N/K
OSHA PEL: N/K
ACGIH TLV: N/K
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: NAPHTHALENE
Ingredient Sequence Number: 02
Percent: 3
Ingredient Action Code:
Ingredient Focal Point: B
NIOSH (RTECS) Number:
CAS Number: 91-20-3
OSHA PEL: N/K
ACGIH TLV: N/K
Other Recommended Limit: N/K

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR LIQUID, PARAFFINIC ODOR.
Boiling Point: 330-572F
Melting Point: N/K
Vapor Pressure (MM Hg/70 F): 2MMHG
Vapor Density (Air=1): >1 AIR=1
Specific Gravity: 0.81 H2O=1
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: NIL
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

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Flash Point: 115F
Flash Point Method: TCC
Lower Explosive Limit: .5
Upper Explosive Limit: 6
Extinguishing Media: USE WATER SPRAY, DRY CHEMICAL, CO2, FOAM.
Special Fire Fighting Proc: USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE VAPORS AND COOL INDIVIDUALS TRYING TO STOP LEAK.

Unusual Fire And Expl Hazrds: PRODUCTS OF COMBUSTION MAY CONTAIN CO₂, CARBON MONOXIDE AND OTHER TOXIC MATERIALS. DO NOT ENTER ENCLOSED OR CONFINED SPACE WITHOUT PROPER PPE INCLUDING RESPIRAT

=====
Reactivity Data
=====

Stability: YES
Cond To Avoid (Stability): HEAT FLAME.
Materials To Avoid: OXIDIZING MATERIALS.
Hazardous Decomp Products: N/K
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): N/K
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Health Hazard Data
=====

LD50-LC50 Mixture: N/K
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: STUDIES WITH RATS & MICE HAVE SHOWN THAT SOME PETROLEUM DISTILLATES HAVE CAUSED DAMAGE OR TUMORS OF THE KIDNEYS OR LIVER. THESE STUDIES ARE INCONCLUSIVE. NAPHTHALENE IS A POTENTIAL IRRITANT TO EYES, SKIN AND LUNGS AND MAY DAMAGE THE BLOOD, EYES AND KIDNEY AFTER PROLONGED OR REPEATED EXPOSURE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: N/K
Signs/Symptoms Of Overexp: THIS PRODUCT MAY CAUSE IRRITATION TO EYES, LUNGS OR SKIN AFTER PROLONGED OR REPEATED EXPOSURE. OVEREXPOSURE MAY CAUSE WEAKNESS, HEADACHE, NAUSEA, ETC. INCLUDING UNCONSCIOUSNESS OR CONVULSIONS DEPENDING ON DEGREE OF OVEREXPOSURE. EXTREME EXPOSURE OR ASPIRATION INTO LUNGS MAY CAUSE PNEUMONIA.
Med Cond Aggravated By Exp: MOUSE SKIN PAINTING STUDIES HAVE SHOWN THAT PETROLEUM MID-DISTILLATES CAN CAUSE SKIN CANCER IF REPEATEDLY APPLIED AND NOT WASHED OFF SKIN. WASHING WITH SOAP/WATER GREATLY REDUCES CHANCES OF CANCER.
Emergency/First Aid Proc: EYES-FLUSH IMMEDIATELY WITH PLENTY OF WATER FOR 15 MIN. IF SWALLOWED, DO NOT INDUCE VOMITING. SEEK MEDICAL ATTENTION FOR BOTH SITUATIONS. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. SKIN-REMOVE CONTAMINATED CLOTHING AS SOON AS POSSIBLE. WASH EXPOSED SKIN WITH SOAP AND WATER. IF IRRITATION PERSISTS CONSULT A PHYSICIAN. NOTE TO PHYSICIAN-GASTRIC LAVAGE MAY BE CONSIDERED BASED ON QUANTITY INGESTED
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Precautions for Safe Handling and Use
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Steps If Matl Released/Spill: CONTAINS SPILL IMMEDIATELY IN SMALLEST POSSIBLE AREA. RECOVER AS MUCH OF THE PRODUCT ITSELF AS POSSIBLE BY VACUUMING, THEN RECOVER RESIDUAL FLUIDS BY USING ABSORBENT MATERIAL. REMOVE CONTAMINATED ITEMS AND PLACE IN PROPER DISPOSAL CONTAINERS.
Neutralizing Agent: N/K
Waste Disposal Method: RECYCLE AS MUCH OF THE RECOVERABLE PRODUCT AS POSSIBLE. DISPOSE OF NONRECYCLABLE MATERIAL IN ACCORDANCE WITH STATE, LOCAL AND FEDERAL REGULATIONS. AVOID WASHING, DRAINING OR DIRECTING MATERIAL TO STORM OR SANITARY SEWERS.
Precautions-Handling/Storing: STORE IN ACCORDANCE WITH NFPA REGULATIONS.
Other Precautions: CONTACT CONOCO FOR MORE INFORMATION.

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Control Measures

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Respiratory Protection: SELECT APPROPRIATE NIOSH APPROVED RESPIRATORY PROTECTION WHERE NECESSARY TO MAINTAIN EXPOSURES BELOW THE ACCEPTABLE LIMITS. PROPER RESPIRATOR SHOULD BE DETERMINED BY ADEQUATELY TRAINED PERSONNEL.

Ventilation: USE SUFFICIENT VENTILATION TO MAINTAIN ATMOSPHERIC CONCENTRATIONS BELOW PERMISSIBLE EXPOSURE LIMITS. AVOID SPARKING MIX.

Protective Gloves: NBR OR NEOPRENE FOR PROLONGED SKIN EXPOS

Eye Protection: SPLASH GOGGLES OR FACE SHIELD FOR SPRAY.

Other Protective Equipment: SUFFICIENT PROTECTIVE CLOTHING TO MINIMIZE SKIN EXPOSURE. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Work Hygienic Practices: AVOID CONTACT WITH EYES, SKIN OR CLOTHING. WASH WITH SOAP AND WATER IF SKIN CONTACT OCCURS.

Suppl. Safety & Health Data: WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. HANDLE AND STORE IN ACCORDANCE WITH NFPA PROCEDURES.

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DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 9150

NIIN: 00B010044

Manufacturer's CAGE: 15958

Part No. Indicator: A

Part Number/Trade Name: NO.2 DIESEL FUEL

General Information

Item Name: N/K

Manufacturer's Name: AMOCO OIL COMPANY

Manufacturer's Street: 200 EAST RANDOLPH DRIVE

Manufacturer's P. O. Box:

Manufacturer's City: CHICAGO

Manufacturer's State: IL

Manufacturer's Country: US

Manufacturer's Zip Code: 60601

Manufacturer's Emerg Ph #: 800 447-8735

Manufacturer's Info Ph #: 312 856-3907

Distributor/Vendor # 1: N/K

Distributor/Vendor # 1 Cage: N/K

Distributor/Vendor # 2: N/K

Distributor/Vendor # 2 Cage: N/K

Distributor/Vendor # 3: N/K

Distributor/Vendor # 3 Cage: N/K

Distributor/Vendor # 4: N/K

Distributor/Vendor # 4 Cage: N/K

Safety Data Action Code:

Safety Focal Point: B

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: N/K

Date MSDS Prepared:

Safety Data Review Date: 04FEB88

Supply Item Manager: N/K

MSDS Preparer's Name: N/K

Preparer's Company: N/K

Preparer's St Or P. O. Box: N/K

Preparer's City: N/K

Preparer's State:

Preparer's Zip Code: N/K

Other MSDS Number:

MSDS Serial Number: BBBDD

Specification Number: N/K

Spec Type, Grade, Class: N/K

Hazard Characteristic Code:

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number: N/K

Net Explosive Weight:

Net Propellant Weight-Ammo: N/K

Coast Guard Ammunition Code:

316138

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: PETROLEUM DISTILLATES (NAPHTHA OR RUBBER SOLVENT)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: B
NIOSH (RTECS) Number: SE7449000
CAS Number: 8002-05-9
OSHA PEL: 400 PPM
ACGIH TLV: 400 PPM; 8990
Other Recommended Limit: N/K

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, BRIGHT LIQUID
Boiling Point: 340F TO 675
Melting Point: N/K
Vapor Pressure (MM Hg/70 F): N/K
Vapor Density (Air=1): N/K
Specific Gravity: 0.88
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: N/K
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: 120F TO 180F
Flash Point Method: TCC
Lower Explosive Limit: 0.6
Upper Explosive Limit: 7.5
Extinguishing Media: AGENTS APPROVED FOR CLASS B HAZARDS: DRY CHEMICAL,
CARBON DIOXIDE, HALOGENATED AGENTS, FOAM, STEAM OR WATER FOG
Special Fire Fighting Proc: N/K
Unusual Fire And Expl Hazrds: N/K

=====

Reactivity Data

=====

Stability: N/K
Cond To Avoid (Stability): N/K
Materials To Avoid: N/K
Hazardous Decomp Products: N/K
Hazardous Poly Occur: N/K
Conditions To Avoid (Poly): N/K

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Health Hazard Data

=====

LD50-LC50 Mixture: N/K

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: TRY TO AVOID CONTINUAL, REPEATED CONTACT AS PROBLEMS COULD ARISE IF PROPER HYGIENE IS NOT TAKEN.

Carcinogenicity - NTP: N/K

Carcinogenicity - IARC: N/K

Carcinogenicity - OSHA: N/K

Explanation Carcinogenicity: N/K

Signs/Symptoms Of Overexp: EYE:NO SIGNIFICANT IRRITATION EXPECTED.SKIN:
CAN CAUSE SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.INHALATION:
NONE EXPECTED UNDER USUAL CONDITIONS OF USE.INGESTION:LOW VISCOSITY
PRODUCT.HARMFUL OR FATAL IF SWALLOWED AND/OR ASPIRATED INTO LUNGS.

Med Cond Aggravated By Exp: N/K

Emergency/First Aid Proc: EYES:FLUSH EYES WITH PLENTY OF WATER.SKIN: WASH
EXPOSED SKIN WITH SOAP AND WATER.REMOVE CONTAMINATED CLOTHING, INCLUDING
SHOES AND CLEAN AND DRY THOROUGHLY BEFORE USE.INHALATION:N/R. INGESTION:IF
SWALLOWED DO NOT INDUCE VOMITING,GET IMMEDIATE MEDICAL ATTENTION.

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Precautions for Safe Handling and Use

=====

Steps If Matl Released/Spill: REMOVE MECHANICALLY OR CONTAIN ON ABSORBANT MATERIAL.

Neutralizing Agent: N/K

Waste Disposal Method: ENCLOSED-CONTROLLED INCINERATION UNLESS DIRECTED OTHERWISE BY APPLICABLE ORDINANCES.

Precautions-Handling/Storing: STORE AWAY FROM HEAT,IGNITION SOURCES.OPEN FLAME,IN ACCORDANCE WITH APPLICABLE REGULATIONS.

Other Precautions: AVOID STRONG OXIDIZERS.

=====

Control Measures

=====

Respiratory Protection: USE WITH ADEQUATE VENTILATION

Ventilation: N/K

Protective Gloves: WEAR PROTECTIVE GLOVES

Eye Protection: USE OF SAFETY GLASSES IS GOOD PRACTICE

Other Protective Equipment: N/K

Work Hygienic Practices: CLEAN UP ANY MESS AND USE GOOD PERSONAL HYGIENE

Suppl. Safety & Health Data:

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

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Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 00N033034

Manufacturer's CAGE: 8Y898

Part No. Indicator: A

Part Number/Trade Name: 0-770, ETHYLBENZENE

=====

General Information

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Item Name:

Manufacturer's Name: CHEM SERVICE INC

Manufacturer's Street: 660 TOWER LANE

Manufacturer's P. O. Box: 3108

Manufacturer's City: WEST CHESTER

Manufacturer's State: PA

Manufacturer's Country: US

Manufacturer's Zip Code: 19381-3108

Manufacturer's Emerg Ph #: 215-692-3026

Manufacturer's Info Ph #: 215-692-3026

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 16MAR92

Safety Data Review Date: 22JUL92

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BPLSP

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: NK

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO
Ingredient: BENZENE, ETHYL-; (ETHYLBENZENE)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM, 125 STEL
ACGIH TLV: 100 PPM, 125 STEL
Other Recommended Limit: N/K

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Physical/Chemical Characteristics

=====

Appearance And Odor: COLORLESS LIQUID WITH AN AROMATIC ODOR
Boiling Point: 277F, 136C
Melting Point: -139F, -95C
Vapor Pressure (MM Hg/70 F): 7.1 @20C
Vapor Density (Air=1): 0.887
Specific Gravity: N/K
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: N/K
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

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Flash Point: 71.6F, 22C
Flash Point Method: N/K
Lower Explosive Limit: 1%
Upper Explosive Limit: 6.7%
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL
PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

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Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: LD50: (ORAL RAT): 3500 MG/KG.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: CAN CAUSE SKIN AND EYE IRRITATION. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY BE HARMFUL IF INHALED. MAY BE HARMFUL IF SWALLOWED. CAN BE IRRITATING TO MUCOUS MEMBRANES. PROLONGED EXPOSURE MAY CAUSE NAUSEA, HEADACHE, DIZZINESS AND/OR EYE DAMAGE. CAN CAUSE NERVOUS SYSTEM INJURY. DUST &/OR VAPORS (EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT.

Signs/Symptoms Of Overexp: HLTH HAZ: CAN CAUSE IRRITATION TO RESPIRATORY TRACT.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYE: FLUSH CONTINUOUSLY WITH WATER FOR 15-20 MINUTES. SKIN: FLUSH WITH WATER FOR 15-20 MINUTES. IF NO BURNS HAVE OCCURED- USE SOAP & WATER TO CLEANSE SKIN. INHAL: MOVE TO FRESH AIR. GIVE OXYGEN IF PATIENT IS HAVING DIFFICULTY BREATHING. IF PATIENT STOPPED BREATHING, GIVE ARTF RESP. IF PATIENT IS IN CARDIAC ARREST GIVE CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MD ARRIVES. INGEST: CALL MD IMMED (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER. DISPOSAL MUST BE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS (FP N).

Precautions-Handling/Storing: KEEP TIGHTLY CLOSED IN A COOL, DRY PLACE. STORE ONLY WITH COMPATIBLE MATERIALS.

Other Precautions: AVOID CONTACT WITH SKIN, EYES AND CLOTHNG. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS-AVOID DIRECT PHYSICAL CONTACT.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation: THIS CHEMICAL SHOULD ONLY BE HANDLED IN A HOOD.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: NONE SPECIFIED BY MANUFACTURER.

Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN.

Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

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DOD Hazardous Materials Information System
DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 9130

NIIN: 001487102

Manufacturer's CAGE: 6Y142

Part No. Indicator: A

Part Number/Trade Name: GASOLINES (ALL GRADES)

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General Information

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Item Name: GASOLINE, AUTOMOTIVE, SPECIAL GRADE MOGAS UNLEADED

Manufacturer's Name: PHILLIPS 66 CO.

Manufacturer's Street: 346 HOME SAVINGS AND LOAN BLDG

Manufacturer's P. O. Box:

Manufacturer's City: BARTLESVILLE

Manufacturer's State: OK

Manufacturer's Country: US

Manufacturer's Zip Code: 74004

Manufacturer's Emerg Ph #: 918-661-3865 OR 918-661-8118

Manufacturer's Info Ph #: 918-661-8327

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 042

Tot Safety Entries This Stk#: 049

Status: SM

Date MSDS Prepared: 31MAR90

Safety Data Review Date: 01AUG93

Supply Item Manager: KY

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BRGRH

Specification Number: VV-G-1690

Spec Type, Grade, Class: SPECIAL GRADE

Hazard Characteristic Code: F2

Unit Of Issue: GL

Unit Of Issue Container Qty: BULK

Type Of Container: TANK

Net Unit Weight: UNKNOWN

NRC/State License Number: NONE

Net Explosive Weight:

Net Propellant Weight-Ammo: NONE

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: GASOLINE
Ingredient Sequence Number: 01
Percent: 100
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: LX3300000
CAS Number: 8006-61-9
OSHA PEL: 300 PPM/500 STEL
ACGIH TLV: 300 PPM/500STEL;9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: BENZENE (SARA III)
Ingredient Sequence Number: 02
Percent: <5
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 03
Percent: <10
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM/150 STEL
ACGIH TLV: 50 PPM; 9293
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA III)
Ingredient Sequence Number: 04
Percent: <2
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM/125 STEL
ACGIH TLV: 100 PPM/125STEL 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: P-XYLENE (P-DIMETHYLBENZENE) (SARA III)
Ingredient Sequence Number: 05
Percent: <3
Ingredient Action Code:
Ingredient Focal Point: D

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NIOSH (RTECS) Number: ZE2625000
CAS Number: 106-42-3
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: M-XYLENE (M-DIMETHYLBENZENE) (SARA III)
Ingredient Sequence Number: 06
Percent: <6
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: ZE2275000
CAS Number: 108-38-3
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: O-XYLENE (O-DIMETHYLBENZENE) (SARA III)
Ingredient Sequence Number: 07
Percent: <3
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: ZE2450000
CAS Number: 95-47-6
OSHA PEL: 100PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: METHYL TERT-BUTYL ETHER (SARA III)
Ingredient Sequence Number: 08
Percent: <15
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: KN5250000
CAS Number: 1634-04-4
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: 1,2,4-TRIMETHYLBENZENE (SARA III)
Ingredient Sequence Number: 09
Percent: <3
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: DC3325000
CAS Number: 95-63-6
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM; 9192
Other Recommended Limit: NONE SPECIFIED

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Physical/Chemical Characteristics

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Appearance And Odor: RED-ORANGE LIQUID. PUNGENT ODOR.

Boiling Point: 80.0F, 26.7C

Melting Point: UNKNOWN

Vapor Pressure (MM Hg/70 F): 350-800 MM

Vapor Density (Air=1): 3-4

Specific Gravity: 0.8

Decomposition Temperature: UNKNOWN

Evaporation Rate And Ref: >1 (BUTYL ACETATE = 1)

Solubility In Water: NEGLIGIBLE

Percent Volatiles By Volume: 100

Viscosity: UNKNOWN

pH: N/K

Radioactivity:

Form (Radioactive Matl):

Magnetism (Milligauss):

Corrosion Rate (IPY): UNKNOWN

Autoignition Temperature: N/K

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Fire and Explosion Hazard Data

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Flash Point: <-35F, <-37C

Flash Point Method: ESTIM.

Lower Explosive Limit: 1.5

Upper Explosive Limit: 7.6

Extinguishing Media: USE CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.

Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. EVACUATE AREA. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.

Unusual Fire And Expl Hazrds: COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS. VAPORS HEAVIER THAN AIR. MAY TRAVEL ALONG GROUND AND FLASHBACK.

=====

Reactivity Data

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Stability: YES

Cond To Avoid (Stability): MFR: "N/A" HMIS: HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION

Materials To Avoid: OXYGEN AND STRONG OXIDIZING AGENTS.

Hazardous Decomp Products: CARBON OXIDES, AND VARIOUS HYDROCARBONS WHEN BURNED.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT APPLICABLE

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Health Hazard Data

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LD50-LC50 Mixture: LD50 ORAL RAT IS UNKNOWN

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS. GASOLINE IF SWALLOWED, MAY BE ASPIRATED INTO LUNGS, RESULTING IN PULMONARY EDEMA AND CHEMICAL PNEUMONITIS. CHRONIC: HAS PRODUCED KIDNEY DAMAGE IN RATS. NOT KNOWN TO OCCUR IN HUMANS.

Carcinogenicity - NTP: YES

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Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: YES

Explanation Carcinogenicity: UNLEADED GASOLINE HAS PRODUCED CANCER IN ANIMALS. NO COMPARABLE HEALTH HAZARD FOR CANCER IS KNOWN TO OCCUR IN HUMANS.

Signs/Symptoms Of Overexp: EYES/SKIN: SLIGHT IRRITATION. INHALATION: HEADACHE, NAUSEA, WEAKNESS, SEDATION, AND UNCONSCIOUSNESS. INGESTION: IRRITATION TO INTESTINES. ASPIRATION INTO LUNG AFTER INGESTION MAY RESULT IN PULMONARY EDEMA AND CHEMICAL PNEUMONITIS.

Med Cond Aggravated By Exp: NO INFORMATION GIVEN ON MSDS BY MFR.

Emergency/First Aid Proc: IF IRRITATION PERSISTS OR IS SEVERE, SEE A DOCTOR. EYE:FLUSH W/WATER 15 MIN. SKIN:WASH WITH SOAP & WATER. (HMIS: REMOVE CONTAMINATED CLOTHING AND LAUNDRER BEFORE REUSE.) INHALED:REMOVE TO FRESH AIR. AID/RESTORE BREATHING IF NECESSARY. INGESTED:DO NOT INDUCE VOMITING; GET IMMEDIATE MEDICAL CARE. **NOTE TO PHYSICIAN:GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE MAY BE USED AT YOUR DISCRETION.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT. ELIMINATE IGNITION SOURCES. SHUT OFF LEAK & CONTAIN SPILL. PROTECT FROM IGNITION. KEEP OUT OF WATER SOURCES & SEWERS. ABSORB ON DRY INERT MATERIAL. TRANSFER TO DRUMS WITH NON-SPARK TOOLS.

Neutralizing Agent: NO INFORMATION GIVEN ON MSDS BY MFR.

Waste Disposal Method: INCINERATE OR OTHERWISE MANAGE IN A RERA PERMITTED WASTE MANAGEMENT FACILITY.

Precautions-Handling/Storing: STORE IN COOL,WELL VENTED AREA, AWAY FROM IGNITION SOURCES. KEEP CONTAINERS CLOSED & PROTECT FROM PHYSICAL DAMAGE. GROUND CONTAINERS DURING TRANSFER.

Other Precautions: PROVIDE MEANS TO CONTROL LEAKS. AVOID BREATHING VAPORS. AVOID EYE, SKIN, CLOTHING CONTACT. DO NOT SIPHON BY MOUTH. LAUNDRER CONTAMINATED CLOTHING BEFORE REUSE. WEAR PROTECTIVE EQUIPMENT WHEN CONDITIONS WARRENT. WASH THOROUGHLY AFTER HANDLING

=====

Control Measures

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Respiratory Protection: FOR CONCENTRATIONS EXCEEDING THE RECOMMENDED LEVEL, USE NIOSH/MSHA APPROVED AIR PUIFYING RESPIRATOR. USE SCBA FOR EXPOSURE TO UNKNOWN LEVELS.

Ventilation: USE ADEQUATE VENTILATION TO CONTROL EXPOSURE BELOW RECOMMENDED LEVELS.

Protective Gloves: VITON, NITRILE, PVA.

Eye Protection: SAFETY GLASSES WITH SIDE SHIELDS.

Other Protective Equipment: FULL BODY LONG-SLEEVED GARMENTS TO PREVENT REPEATED OR PROLONGED SKIN CONTACT. HMIS: EYE WASH STATION AND SAFETY SHOWER.

Work Hygienic Practices: MFR: ? HMIS:USE GOOD INDUSTRIAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.

Suppl. Safety & Health Data: KEY2:KT NOTE:MFR SUPPLIED ONE MSDS FOR BOTH LEADED AND UNLEADED GASOLINES. HMIS DELETED REFERENCES TO LEAD FROM THOSE FOR "UNLEADER" GASOLINE

DOD Hazardous Materials Information System

316148

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 00N040300

Manufacturer's CAGE: 60928

Part No. Indicator: A

Part Number/Trade Name: HEXANE ACS GRADE

General Information

Item Name: N-HEXANE

Manufacturer's Name: ALDRICH CHEMICAL CO

Manufacturer's Street:

Manufacturer's P. O. Box: 355

Manufacturer's City: MILWAUKEE

Manufacturer's State: WI

Manufacturer's Country: US

Manufacturer's Zip Code: 53201

Manufacturer's Emerg Ph #: 414-273-3850

Manufacturer's Info Ph #: 414-273-3850

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 04AUG92

Safety Data Review Date: 03MAR93

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BRZJT

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: NK

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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316149

Proprietary: NO
Ingredient: HEXANE
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: MN9275000
CAS Number: 110-54-3
OSHA PEL: 500 PPM
ACGIH TLV: 50 PPM; 9293
Other Recommended Limit: N/K

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Physical/Chemical Characteristics

=====

Appearance And Odor: COLORLESS LIQUID
Boiling Point: 154F, 68C
Melting Point: N/K
Vapor Pressure (MM Hg/70 F): 132@20C
Vapor Density (Air=1): 3
Specific Gravity: 0.661
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: N/K
Percent Volatiles By Volume: N/K
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: -10F, -23C
Flash Point Method: N/K
Lower Explosive Limit: 1.2%
Upper Explosive Limit: 7.7%
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.
Unusual Fire And Expl Hazrds: VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK. CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS. EXTREMELY FLAMMABLE.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): HEAT, SPARKS AND OPEN FLAME.
Materials To Avoid: OXIDIZING AGENTS. CHLORINE, FLUORINE, MAGNESIUM PERCHLORATGE.
Hazardous Decomp Products: TOXIC FUMES OF: CARBON MONOXIDE, CARBON

DIOXIDE.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

316150

Health Hazard Data

LD50-LC50 Mixture: LD50: (ORAL,RAT) 28710 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THRU SKIN. VAPOR OR MIST IS IRRITATING TO EYES, MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. CAUSES SKIN IRRITATION. MAY CAUSE NERVOUS SYSTEM DISTURBANCES. EXPOSURE CAN CAUSE: COUGHING, CHEST PAINS, DIFFICULTY IN BREATHING. LUNG IRRIT, CHEST PAIN (EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT

Signs/Symptoms Of Overexp: HLTH HAZ: & EDEMA WHICH MAY BE FATAL. GI DISTURBANCES, NAUSEA, HEADACHE AND VOMITING.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYES: IMMED FLUSH W/COPIOUS AMTS OF WATER FOR @ LST 15 MIN & SEEK MED ADVICE. SKIN: IMMED FLUSH W/COPIOUS AMTS OF WATER FOR @ LST 15 MIN WHILE REMOVING CONTAMD CLTHG & SHOES. WASH CONTAMD CLTHG BEFORE REUSE. INHAL: REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH W/ WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVAC AREA. SHUT OFF ALL SOURCES OF IGNIT. WEAR NIOSH/MSHA APPRVD SCBA, RUBB BOOTS & HEAVY RUBB GLOVES. COVER W/AN ACTIVATED CARBON ABSORB, TAKE UP & PLACE IN CLSD CONTRS. TRANSPORT OUTDOORS. VENT AREA & WASH SPILL SITE AFTER MATL PICKUP IS COMPLETE.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE. OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

Precautions-Handling/Storing: KEEP TIGHTLY CLSD. STORE IN A COOL DRY PLACE. DO NOT BREATHE VAP. AVOID CONT W/EYES/SKIN/CLTHG. IRRITANT. HARMFUL VAP. NEUROLOGICAL HAZARD.

Other Precautions: KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation: USE ONLY IN A CHEMICAL FUME HOOD.

Protective Gloves: CHEMICAL-RESISTANT GLOVES.

Eye Protection: CHEMICAL SAFETY GOGGLES.

Other Protective Equipment: OTHER PROTECTIVE CLOTHING, SAFETY SHOWER AND EYE BATH.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 001743218

Manufacturer's CAGE: 1B464

Part No. Indicator: A

Part Number/Trade Name: LEAD FLAKE

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General Information

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Item Name: LEAD, ACS

Manufacturer's Name: FISHER SCIENTIFIC CO CHEMICAL DIV.

Manufacturer's Street: 1 REAGENT LANE

Manufacturer's P. O. Box:

Manufacturer's City: FAIR LAWN

Manufacturer's State: NJ

Manufacturer's Country: US

Manufacturer's Zip Code: 07410

Manufacturer's Emerg Ph #: 201-796-7100 OR 201-796-7523

Manufacturer's Info Ph #: 201-796-7100

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 24JUN88

Safety Data Review Date: 18MAR92

Supply Item Manager: CX

MSDS Preparer's Name: GASTON L. PILLORI

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BMDMP

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: T6

Unit Of Issue: BT

Unit Of Issue Container Qty: 1

Type Of Container: UNKNOWN

Net Unit Weight: 1.1 LB

NRC/State License Number: N/R

Net Explosive Weight:

Net Propellant Weight-Ammo: N/R

Coast Guard Ammunition Code:

316152

Ingredients/Identity Information

Proprietary: NO
Ingredient: LEAD (SARA III)
Ingredient Sequence Number: 01
Percent: >99
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: OF7525000
CAS Number: 7439-92-1
OSHA PEL: 0.05 MG/M3;1910.1025
ACGIH TLV: 0.15 MG/M3;DUST 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: BISMUTH
Ingredient Sequence Number: 02
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: EB2600000
CAS Number: 7440-69-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: COPPER (SARA III)
Ingredient Sequence Number: 03
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: GL5325000
CAS Number: 7440-50-8
OSHA PEL: 0.1MG/M3 FUME/1 DUST
ACGIH TLV: 0.2MG/M3 FUME; 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ARSENIC (SARA III)
Ingredient Sequence Number: 04
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: CG0525000
CAS Number: 7440-38-2
OSHA PEL: 0.5 MG/M3 (AS)
ACGIH TLV: 0.01, A1 MG/M3; 9394
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ANTIMONY (SARA III)
Ingredient Sequence Number: 05
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D

NIOSH (RTECS) Number: CC4025000
CAS Number: 7440-36-0
OSHA PEL: 0.5 MG/M3
ACGIH TLV: 0.5 MG SB/M3; 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: TIN
Ingredient Sequence Number: 06
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: XP7320000
CAS Number: 7440-31-5
OSHA PEL: 2 MG/M3
ACGIH TLV: 2 MG/M3; 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: IRON
Ingredient Sequence Number: 07
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: NO4565500
CAS Number: 7439-89-6
OSHA PEL: 5 MG/M3
ACGIH TLV: 10 MG/M3 AS FE2O3
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: SILVER (SARA III)
Ingredient Sequence Number: 08
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: VW3500000
CAS Number: 7440-22-4
OSHA PEL: 0.01 MG/M3
ACGIH TLV: 0.1 MG/M3; 9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ZINC (SARA III)
Ingredient Sequence Number: 09
Percent: <1
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: ZG8600000
CAS Number: 7440-66-6
OSHA PEL: 10 MG ZNO/M3
ACGIH TLV: 10 MG ZNO/M3; 9192
Other Recommended Limit: NONE SPECIFIED

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Physical/Chemical Characteristics

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~~316154~~

Appearance And Odor: BLUISH-WHITE TO SILVER-GRAY SOLID

Boiling Point: 3164F, 1740C

Melting Point: 622F, 328C

Vapor Pressure (MM Hg/70 F): N/R

Vapor Density (Air=1): N/R

Specific Gravity: 11.3

Decomposition Temperature: UNKNOWN

Evaporation Rate And Ref: N/R

Solubility In Water: NEGLIGIBLE

Percent Volatiles By Volume: 0

Viscosity:

pH: N/R

Radioactivity:

Form (Radioactive Matl):

Magnetism (Milligauss):

Corrosion Rate (IPY): UNKNOWN

Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: NONE

Flash Point Method: N/R

Lower Explosive Limit: N/R

Upper Explosive Limit: N/R

Extinguishing Media: USE AGENT SUITABLE FOR SURROUNDING FIRE.

Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.

Unusual Fire And Expl Hazrds: COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS.

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Reactivity Data

=====

Stability: YES

Cond To Avoid (Stability): HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION

Materials To Avoid: STRONG OXIDIZING AGENTS, ACTIVE METALS, STRONG MINERAL ACIDS.

Hazardous Decomp Products: LEAD OXIDE FUMES.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT APPLICABLE

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Health Hazard Data

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LD50-LC50 Mixture: ORAL LD50 (RAT) IS UNKNOWN

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: WHILE IT IS POSSIBLE FOR LEAD TAKEN IN EXTREMELY LARGE DOSES TO CAUSE ENCEPHALOPATHY, A BRAIN CONDITION THAT CAN RESULT IN SEIZURES, COMA AND DEATH, EXPOSURES OF THIS MAGNITUDE ARE HIGHLY UNUSUAL. CHRONIC: MAY RESULT IN DAMAGE TO THE BLOOD-FORMING, NERVOUS, URINARY AND REPRODUCTIVE SYSTEMS.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT LISTED BY NTP, IARC OR OSHA AS A CARCINOGEN.

Signs/Symptoms Of Overexp: LOSS OF APPETITE, METALLIC TASTE IN THE MOUTH, ANXIETY, CONSTIPATION, NAUSEA, PALLOR, EXCESSIVE TIREDNESS, WEAKNESS, INSOMNIA, HEADACHE, NERVOUS IRRITABILITY, MUSCLE AND JOINT SORENESS, TREMORS, DIZZINESS, AND ABDOMINAL PAIN.

Med Cond Aggravated By Exp: DISEASES OF THE BLOOD-FORMING, NERVOUS, URINARY AND REPRODUCTIVE SYSTEMS. EXPOSURE TO LEAD MAY RESULT IN INJURY TO A DEVELOPING FETUS.

Emergency/First Aid Proc: IF A PERSON BREATHES IN A LARGE AMOUNT OF DUST OR FUMES, REMOVE FROM EXPOSURE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. CALL A PHYSICIAN. IF LEAD HAS BEEN INGESTED, INDUCE VOMITING IF THE INDIVIDUAL IS CONSCIOUS. CALL A PHYSICIAN. IF LEAD GETS IN EYES, FLUSH WITH A LARGE AMOUNT OF WATER. CALL A PHYSICIAN.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: CLEAN UP BY VACUUMING TO MINIMIZE DUST EXPOSURE. PROVIDE CLEAN UP EMPLOYEES WITH RESPIRATORS IF THE POSSIBILITY FOR EXPOSURE TO DUST OR FUMES EXISTS.

Neutralizing Agent: NOT APPLICABLE

Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE & LOCAL LAWS AND REGULATIONS.

Precautions-Handling/Storing: NONE REQUIRED.

Other Precautions: NONE

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Control Measures

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Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR LEAD, IF EXPOSURES EXCEED THE OSHA LIMIT.

Ventilation: USE ADEQUATE MECHANICAL VENTILATION.

Protective Gloves: LEATHER GLOVES

Eye Protection: OSHA APPROVED SAFETY GLASSES.

Other Protective Equipment: NONE REQUIRED

Work Hygienic Practices: WASH THOROUGHLY BEFORE EATING OR SMOKING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Suppl. Safety & Health Data: EXPOSURE TO LEAD IS REGULATED BY OSHA

1910.1025

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

316156

FSC: 6550

NIIN: 012370525

Manufacturer's CAGE: 1B464

Part No. Indicator: A

Part Number/Trade Name: METHANOL

General Information

Item Name: METHANOL, TECHNICAL

Manufacturer's Name: FISHER SCIENTIFIC CO; CHEMICAL MFG DIV

Manufacturer's Street: 1-REAGENT LN

Manufacturer's P. O. Box:

Manufacturer's City: FAIR LAWN

Manufacturer's State: NJ

Manufacturer's Country: US

Manufacturer's Zip Code: 07410-2802

Manufacturer's Emerg Ph #: 201-796-7100

Manufacturer's Info Ph #: 201-796-7100

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 08FEB92

Safety Data Review Date: 19APR93

Supply Item Manager: KX

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BQMLG

Specification Number: NONE

Spec Type, Grade, Class: NONE

Hazard Characteristic Code: F3

Unit Of Issue: PG

Unit Of Issue Container Qty: 4 X 4 L

Type Of Container: BOTTLE

Net Unit Weight: 6.8 LBS

NRC/State License Number: NONE

Net Explosive Weight:

Net Propellant Weight-Ammo: NONE

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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316157

Proprietary: NO
Ingredient: METHYL ALCOHOL (METHANOL) (SARA III)
Ingredient Sequence Number: 01
Percent: >99
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S,200PPM/250STEL
ACGIH TLV: S,200PPM/250STEL; 93
Other Recommended Limit:

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, COLORLESS LIQUID
Boiling Point: 149F, 65C
Melting Point: -137F, -94C
Vapor Pressure (MM Hg/70 F): 97 MM
Vapor Density (Air=1): 1.11
Specific Gravity: 0.792
Decomposition Temperature: 725F, 385C
Evaporation Rate And Ref: 4.6 (BUT ACETAT=1
Solubility In Water: VERY SOLUBLE
Percent Volatiles By Volume: 100
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: 52.0F, 11.1C
Flash Point Method: TCC
Lower Explosive Limit: 6.0
Upper Explosive Limit: 36.0
Extinguishing Media: DRY CHEMICAL, CARBON DIOXIDE, ALCOHOL-RESISTANT FOAM, WATER SPRAY
Special Fire Fighting Proc: NONE CONTAINER FROM AREA IF W/O RISK. DIKE
FIRE CONTROL WATER FOR DISPOSAL. APPLY COOLING WATER TO SIDES OF
CONTAINERS. KEEP AWAY FROM ENDS OF TANKS.
Unusual Fire And Expl Hazrds: EXTINGUISH IF FLOW CAN BE STOPPED. USE WATER
IN FLOODING AMOUNTS. FOG/STREAMS MAY NOT BE EFFECTIVE. APPLY FROM MAXIMUM
DISTANCE. AVOID BREATHING TOXIC VAPORS.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): NO INFORMATION GIVEN ON MSDS BY MFR. HMIS:
HEAT, SPARKS, OPEN FLAME AND OTHER SOURCES OF IGNITION.
Materials To Avoid: STRONG OXIDIZERS, REACTIVE METALS
Hazardous Decomp Products: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE

OXIDES OF CARBON.

316158

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NONE SPECIFIED

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL RAT) IS 7300 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE-METHANOL IRRITATES BODY TISSUES AND IS ABSORBED BY THE SKIN. IT CAUSES SYMPTOMS OF INEBRIATION FOLLOWED BY AN ASYMPTOMATIC PERIOD WITH PERMANENT EFFECTS FOLLOWING. IT IS A NEUROTOXIN, ACTING ON THE OPTIC NERVE CAUSING BLINDNESS AT WELL BELOW A FATAL DOSE. CHROMIC EFFECTS ARE SIMILAR TO THE ACUTE.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NO INFORMATION GIVEN ON MSDS BY MFR.

Signs/Symptoms Of Overexp: EYE:SEVERE IRRITATION, POSSIBLE CORNEAL DAMAGE. SKIN:IRRITATION. ABSORPTION CAUSES SYSTEMIC EFFECTS SIMILAR TO INGEST.

INHALED:RESPIRATORY IRRITATION, COUGHING. LEADS TO SYSTEMIC EFFECTS.

INGESTED:TRANSIENT INEBRIATION FOLLOWED BY ASYMPTOMATIC PERIOD FOLLOWED BY HEADACHE, DIZZINESS, VERTIGO, VOMITING, VISUAL EFFECTS.

Med Cond Aggravated By Exp: INDIVIDUALS WITH KIDNEY, EYE, OR SKIN DISORDER MAY BE AT INCREASED RISK FROM EXPOSURE OF THIS MATERIAL.

Emergency/First Aid Proc: EYE:FLUSH W/WATER 15 MIN, HOLD LIDS OPEN.

SKIN:REMOVE CONTAMINATED CLOTHING AND LAUNDRER BEFORE REUSE. WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR. RESTORE/AID BREATHING AS NEEDED.

INGESTED:IMMEDIATELY GIVE 2 LARGE GLASSES OF MILK OR WATER AND INDUCE VOMITING. (NOTHING BY MOUTH IF UNCONSCIOUS.) GET IMMEDIATE MEDICAL CARE. IF ANY IRRITATION PERSISTS OR IS SEVERE, SEE A DOCTOR.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE IGNITION SOURCES. CONTAIN LIQUID. USE PERSONAL PROTECTIVE EQUIPMENT. EVACUATE AREA IF POSSIBLE. ABSORB ON VERMICULITE. SCOOP UP AND PLACE IN A SUITABLE CONTAINER. KEEP PENDING DISPOSAL INSTRUCTIONS.

Neutralizing Agent: NONE

Waste Disposal Method: OBSERVE ALL LOCAL, STATE AND FEDERAL REGULATIONS WHEN STORING OR DISPOSING OF THIS MATERIAL. FOR ASSISTANCE CONTACT DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

Precautions-Handling/Storing: STORE IN COOL, DRY AND WELL-VENTILATED AREA. HANDLE AS CLASSIFIED FLAMMABLE LIQUIDS.

Other Precautions: DO NOT SMOKE.AVOID CONTACT WITH EYES,SKIN & CLOTHINGS. DO NOT INHALE OR INGEST.

Control Measures

Respiratory Protection: THE SPECIFIC RESPIRATOR SELECTED SHOULD BE BASED ON THE LEVELS OF CONTAMINATION IN THE WORKPLACE. FISHER REQUIRES THAT THEY CARRY NIOSH AND MSHA APPROVAL. THEY VARY FROM A SIMPLE DUST/MIST RESPIRATOR TO AN SCBM DEPENDING ON THE EXPOSURE.

Ventilation: PROVIDE GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

Protective Gloves: PROTECTIVE

Eye Protection: SPLASH PROOF GOGGLES

Other Protective Equipment: EYE WASH STATION AND SAFETY SHOWER, WEAR PROTECTIVE CLOTHING AS NECESSARY TO PREVENT PROLONGED/REPEATED SKIN CONTACT. **316159**

Work Hygienic Practices: MFR: ? HMIS:USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.

Suppl. Safety & Health Data: KEY2:KT MSDS RECEIVED FROM NAVY (FOCAL POINT N). CAGE CODE AND NSN IDENTIFIED BY THEM.

DOD Hazardous Materials Information System

316160

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 8040

NIIN: 001163668

Manufacturer's CAGE: 54527

Part No. Indicator: B

Part Number/Trade Name: METHYL ETHYL KETONE

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General Information

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Item Name: METHYL ETHYL KETONE

Manufacturer's Name: SHELL OIL COMPANY

Manufacturer's Street: 1 SHELL PLAZA

Manufacturer's P. O. Box: 2463

Manufacturer's City: HOUSTON

Manufacturer's State: TX

Manufacturer's Country: US

Manufacturer's Zip Code: 77001

Manufacturer's Emerg Ph #: 713-473-9461 (24 HOUR EMERGENCY)

Manufacturer's Info Ph #: 713-241-4819

Distributor/Vendor # 1: RUSCOE W J CO

Distributor/Vendor # 1 Cage: 86839

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: G

Record No. For Safety Entry: 002

Tot Safety Entries This Stk#: 002

Status: SE

Date MSDS Prepared: 26JAN89

Safety Data Review Date: 25JAN93

Supply Item Manager: 75

MSDS Preparer's Name: J. C. WILLETT

Preparer's Company: SHELL OIL CO-PRODUCT SAFETY & COMPLAINE

Preparer's St Or P. O. Box: P.O. BOX 4320

Preparer's City: HOUSTON

Preparer's State: TX

Preparer's Zip Code: 77210

Other MSDS Number:

MSDS Serial Number: BPVMN

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: F3

Unit Of Issue: BT

Unit Of Issue Container Qty: UNKNOWN

Type Of Container: UNKNOWN

Net Unit Weight: UNKNOWN

NRC/State License Number:

Net Explosive Weight: N/R

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code: N/R

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Ingredients/Identity Information

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316161

Proprietary: NO
Ingredient: METHYL ETHYL KETONE (2-BUTANONE) (MEK) (SARA III)
Ingredient Sequence Number: 01
Percent: 100
Ingredient Action Code:
Ingredient Focal Point: G
NIOSH (RTECS) Number: EL6475000
CAS Number: 78-93-3
OSHA PEL: 200 PPM/300 STEL
ACGIH TLV: 200 PPM/300 STEL 9293
Other Recommended Limit: NONE RECOMMENDED

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS MOBILE LIQUID. PUNGENT ODOR.
Boiling Point: 175F, 79C
Melting Point: -124F, -87C
Vapor Pressure (MM Hg/70 F): 70.2 @68F
Vapor Density (Air=1): 2.5
Specific Gravity: 0.81
Decomposition Temperature: N/R
Evaporation Rate And Ref: 3.8
Solubility In Water: APPRECIABLE
Percent Volatiles By Volume: 100
Viscosity:
pH: N/R
Radioactivity: N/R
Form (Radioactive Matl): N/R
Magnetism (Milligauss): N/R
Corrosion Rate (IPY): N/R
Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: 23.0F, -5.0C
Flash Point Method: TCC
Lower Explosive Limit: 1.8
Upper Explosive Limit: 11.5
Extinguishing Media: WATER FOG, "ALCOHOL" FOAM, DRY CHEMICAL OR CO2.
Special Fire Fighting Proc: REMOVE PERSONNEL. USE HELMET WITH FACE
SHIELD, BUNKER COAT, GLOVES, RUBBER BOOTS. USE NIOSH POSITIVE PRESSURE SCBA.
COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: VAPOR PRESSURE BUILDUP FROM THE HEAT OF A
FIRE CAN CAUSE CONTAINERS TO RUPTURE.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): HEAT, SPARKS, FLAMES,
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: CARBON MONOXIDE AND UNIDENTIFIED ORGANIC
COMPOUNDS ARE FORMED DURING COMBUSTION.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE.

Health Hazard Data

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LD50-LC50 Mixture: LD50 ORAL(RAT) 3.4 G/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: EYES:MODERATELY IRRITATING.HIGH VAPOR CONCENTRATIONS ALSO IRRITATING.SKIN:MODERATELY IRRITATING.PROLONGED EXPOSURE DEFATS OR DRYs SKIN.INHAL:IRRITATES NOSE,THROAT AND RESPIRATORY TRACT.INGEST:MODERATELY TOXIC.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: ALTHOUGH NOT LISTED BY NTP,IARC AND OSHA, IT HAS BEEN LISTED BY RTECS AS A MUTAGEN.

Signs/Symptoms Of Overexp: SKIN:IRRITATION,DEMATITIS FROM DEFATTING. INHAL:HIGH VAPOR CONCENTRATION CAN CAUSE CNS DEPRESSION.INGEST:MAY CAUSE CNS DEPRESSION IF SWALLOWED.CNS DEPRESSION STARTS WITH GIDINESS,HEADACHE, NAUSEA,DIZZINESS.IT CAN PROGRESS TO UNCONSCIOUSNESS AND DEATH.

Med Cond Aggravated By Exp: PREEXISTING EYE,SKIN AND RESPIRATORY DISORDERS.

Emergency/First Aid Proc: EYES:FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING LIDS OPENED.CALL PHYSICIAN.SKIN:FLUSH WITH WATER.REMOVE CONTAMINATED CLOTHING.CALL PHYSICIAN IF IRRITATION PERSISTS.INHAL:REMOVE TO FRESH AIR.GIVE OXYGEN FOR DIFFICULT BREATHING.GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING.CALL PHYSICIAN.INGEST:GIVE TWO GLASSES OF WATER(IF CONSCIOUS).INDUCE VOMITING,KEEPING HEAD BELOW HIPS.CALL PHYSICIAN.

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Precautions for Safe Handling and Use

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Steps if Matl Released/Spill: ELIMINATE SOURCES OF IGNITION.HANDLING EQUIPMENT SHOULD BE GROUNDED.LARGE SPILL:REMOVE PERSONNEL,STOP LEAK,DIKE AND CONTAIN.SUPPRESS VAPOR CLOUD WITH WATER FOG.CONTAIN RUNOFF.REMOVE WITH VACUUM TRUCKS,PUMP TO STORAGE/SALVAGE VESSEL.CLEAN UP RESIDUE.

Neutralizing Agent: NOT APPLICABLE.

Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH FEDERAL,SATE AND LOCAL REGULATIONS.

Precautions-Handling/Storing: KEEP CONTAINERS CLOSED AND UPRIGHT.

Other Precautions: GROUND OR BOND CONTAINERS WHEN TRANSFERRING LIQUID.

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Control Measures

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Respiratory Protection: USE A NIOSH APPROVED FULL FACED ATMOSPHERE SUPPLYING RESPIRATOR OR A RESPIRATOR FOR ORGANIC VAPORS.

Ventilation: USE GENERAL MECHANICAL OR LOCAL EXHAUST.

Protective Gloves: CHEMICAL RESISTANT GLOVES.

Eye Protection: CHEMICAL GOGGLES.

Other Protective Equipment: USE PROTECTIVE CLOTHING TO MINIMIZE SKIN CONTACT.

Work Hygienic Practices: USE STANDARD HYGENIC PRACTICES.

Suppl. Safety & Health Data: KEY1:F3.

DOD Hazardous Materials Information System

316163

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 001746591

Manufacturer's CAGE: 70829

Part No. Indicator: A

Part Number/Trade Name: 9326, NITROBENZENE

General Information

Item Name: NITROBENZENE,ACS

Manufacturer's Name: J.T.BAKER CHEMICAL CO

Manufacturer's Street: 222 RED SCHOOL LANE

Manufacturer's P. O. Box:

Manufacturer's City: PHILLIPSBURG

Manufacturer's State: NJ

Manufacturer's Country: US

Manufacturer's Zip Code: 08865

Manufacturer's Emerg Ph #: 201-859-2151, CHEMTREC 800-424-9300

Manufacturer's Info Ph #: 800-JTBAKER

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 003

Tot Safety Entries This Stk#: 004

Status: SE

Date MSDS Prepared: 01MAY89

Safety Data Review Date: 21MAR94

Supply Item Manager: CX

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BSVYD

Specification Number: O-C-265C

Spec Type, Grade, Class: NONE

Hazard Characteristic Code: T3

Unit Of Issue: BT

Unit Of Issue Container Qty: 500 ML

Type Of Container: BOTTLE

Net Unit Weight: 1.3 LBS

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

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Ingredients/Identity Information

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316164

Proprietary: NO
Ingredient: NITROBENZENE (SARA III)
Ingredient Sequence Number: 01
Percent: 90-100
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: DA6475000
CAS Number: 98-95-3
OSHA PEL: S, 1 PPM
ACGIH TLV: S, 1 PPM; 9192
Other Recommended Limit: NONE SPECIFIED BY M.

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Physical/Chemical Characteristics

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Appearance And Odor: YELLOW VISCOUS LIQUID, ALMOND ODOR.
Boiling Point: 412F, 211C
Melting Point: N/R
Vapor Pressure (MM Hg/70 F): <1
Vapor Density (Air=1): 4.24
Specific Gravity: 1.20
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/A
Solubility In Water: SLIGHT
Percent Volatiles By Volume: 100
Viscosity:
pH: N/R
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/R
Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: 189F, 87C
Flash Point Method: CC
Lower Explosive Limit: 1.8%
Upper Explosive Limit: N/A
Extinguishing Media: WATER SPRAY, DRY CHEMICAL, FOAM OR CARBON DIOXIDE
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD WEAR PROTECTIVE CLOTHING AND SELF-CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: VAPORS ARE HEAVIER THAN AIR, MAY SETTLE AT LOW AREAS OR TRAVEL SOME DISTANCE ALONG THE GROUND TO IGNITION SOURCES WHERE THEY MAY IGNITE OR EXPLODE.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): HIGH TEMPERATURE, FREEZING AND LIGHT.
Materials To Avoid: STRONG REDUCING AND OXIDIZING AGENTS, STRONG ACIDS/ AKALIS, ALKALINE METALS, GLYCEROL, ANILINE, NITROGEN TETROXIDE.
Hazardous Decomp Products: OXIDES OF NITROGEN AND CARBON.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

Health Hazard Data

LD50-LC50 Mixture: LD50, ORAL (RAT) = 640 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE-EYE/SKIN:IRRITATION. INHALATION AND INGESTION:MAY BE FATAL, WILL CAUSE CYANOSIS AND IRRITATION OF MUCUS MEMBRANES. CHRONIC-CNS, LIVER AND KIDNEY DAMAGE, ANEMIA, BLURRED VISION. TARGET ORGANS:LIVER, KIDNEY, SKIN, BLOOD AND CARDIOVASCULAR SYSTEM.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity:

Signs/Symptoms Of Overexp: HEADACHE, NAUSEA, VOMITING, DIZZINESS, WEAKNESS, UNCONSCIOUSNESS, CONVULSIONS, LOW BLOOD PRESSURE, RAPID INEFFECTIVE BREATHING, INCREASED HEART RATE, DEATH MAY OCCUR.

Med Cond Aggravated By Exp: RESPIRATORY SYSTEM, LIVER, HEART AND BLOOD DISORDERS.

Emergency/First Aid Proc: INHALATION:REMOVE TO FRESH AIR, PROVIDE CPR/OXYGEN IF NEEDED. GET MEDICAL HELP. EYE:FLUSH WITH WATER FOR 15 MIN. GET MEDICAL HELP. SKIN:FLUSH WITH WATER FOR 15 MIN, REMOVE CONTAMINATED CLOTHING, CLEAN ENTIRE CONTAMINATED AREA, ESPECIALLY SCLAP AND NAILS THOROUGHLY BY SCRUBING. GET MED ATTENTION IF SYMPTOMS PERSIST. INGESTION: IMMEDIATELY INDUCE VOMITING IF CONSCIOUS, GET MEDICAL HELP IMMEDIATELY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR SCBA AND FULL PROTECTIVE EQUIPMENT. SHUT OFF IGNITION SOURCES. USE WATER SPRAY TO REDUCE VAPORS. ABSORB SPILL WITH SAND OR VEMICULITE AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

Neutralizing Agent: N/A

Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL VENTILATED AREA AWAY FROM INCOMPATIBLES. DO NOT FREEZE.

Other Precautions: USE IN WELL VENTILATED AREA AND AVOID CONTACT.

Control Measures

Respiratory Protection: USE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS IF TLV IS EXCEEDED OR WHEN SPRAYING OR USING IN CONFINED SPACES.

Ventilation: LOCAL OR GENERAL.

Protective Gloves: VITON

Eye Protection: SAFETY GLASSES WITH FACE SHIELD.

Other Protective Equipment: LONG SLEEVED WORKING CLOTHES.

Work Hygienic Practices: DO NOT EAT, DRINK OR SMOKE WHILE WORKING WITH THIS PRODUCT.

Suppl. Safety & Health Data:

316166



U.S. Department of Labor
Occupational Safety & Health Administration
OSHA Computerized Information System (OCIS)

Nitrotoluene

NM : Nitrotoluene
REV : 19920824
SYN : ortho-Nitrotoluene; o-Nitrotoluol; meta-Nitrotoluene; m-Nitrotoluol;
para-Nitrotoluene; p-Nitrotoluol
IMIS : 1945
CAS : 99-08-1
NIOSH : RTECS XT3150000; 83053; XT2975000; 83052; XT3325000; 83054
DOT : UN1664 Poison
DESC : Ortho/meta: Yellow liquid or solid, weak, aromatic odor.
Para: Pale yellow solid; weak, aromatic odor. MW: 137
BP: 432/450/460 F VP: 0.15/0.15/0.12 mm
MP: 25/61/126 F
OSHA : 5 ppm, 30 mg/m3 (Skin)
TLV : 2 ppm, 11 mg/m3 TWA (Skin)
REL : 2 ppm TWA (Skin)
SYMPT : Anoxia; cyanosis; headaches; weakness, dizziness; ataxia; dyspnea,
tachycardia; nausea, vomiting
HLTH : Hematologic (Blood) Disturbances---Methemoglobinemia (HE13)
Skin sensitization (HE3)
ORG : Blood, CNS, CVS, skin, GI tract
SLC1 : MEDIA: Silica Gel Tube (150/75 mg sections, 20/40 mesh)
ANL SOLVENT: Methanol
MAX V: 30 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 1 (NIOSH 2005) SAE: 0.10 CLASS: Fully Validated
SAM2 : DEVICE: Instrumentation COMPANY: Foxboro
PART #: MIRAN 1A & 1B RANGE: 1.8 ppm @ 11.8 um CLASS: Mfg
SS : 258200

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

316167

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 00N030972

Manufacturer's CAGE: ID893

Part No. Indicator: A

Part Number/Trade Name: 506, CYCLONITE HEXOGEN

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General Information

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Item Name:

Manufacturer's Name: HOLSTON DEFENSE CORP

Manufacturer's Street: WEST STONE DR

Manufacturer's P. O. Box:

Manufacturer's City: KINGSPORT

Manufacturer's State: TN

Manufacturer's Country: US

Manufacturer's Zip Code: 37660

Manufacturer's Emerg Ph #: 615-247-9111

Manufacturer's Info Ph #: 615-247-9111

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 24MAY86

Safety Data Review Date: 01JUN92

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BNVHY

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: NK

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

316168

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: S-TRIAZINE, HEXAHYDRO-1,3,5-TRINITRO-; (CYCLOTRIMETHYLENE -
TRINITRAMINE)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: XY9450000
CAS Number: 121-82-4
OSHA PEL: 15 MG/M3,S
ACGIH TLV: 15 MG/M3,S
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: SUPP DATA:MUST BE PRECEDED BY WASHING/STEAMING & CHEM
NEUTRALIZATION/DISSOLUTION. CONTAM PROPERTY MUST NOT BE BURIED.
Ingredient Sequence Number: 02
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: FIRE FIGHT PROC:WHEN SUBJECTED TO CONFINEMENT, SHOCK, OR OTHER
SUFFICIENT INITIATION SOURCE. NO ATTEMPT TO FIGHT (ING 4)
Ingredient Sequence Number: 03
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 3:FIRES INVOLVING EXPLOS SHOULD BE MADE EXCEPT FOR MANUAL
ACTIVATION OF INSTALLED FIRE EXTINGUISHING EQUIP. (ING 5)
Ingredient Sequence Number: 04
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 4:PERS SHOULD LEAVE BLDG IMMED;USE AS MUCH PROT COVER AS

POSS/ACTIVATING DELUGE SYS/FIRE ALARM EQUIP WHILE ESCAPING.

Ingredient Sequence Number: 05

Percent:

Ingredient Action Code:

Ingredient Focal Point: N

NIOSH (RTECS) Number: 9999999ZZ

CAS Number: N/K

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Other Recommended Limit: NONE SPECIFIED

316169

Proprietary: NO

Ingredient: CNDTNS TO AVOID:SUFFICIENT ENERGY LEVEL.

Ingredient Sequence Number: 06

Percent: N/K

Ingredient Action Code:

Ingredient Focal Point: N

NIOSH (RTECS) Number: 9999999ZZ

CAS Number: N/K

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Other Recommended Limit: N/K

Proprietary: NO

Ingredient: MATLS TO AVOID:& METAL FRAGMENTS.

Ingredient Sequence Number: 07

Percent: N/K

Ingredient Action Code:

Ingredient Focal Point: N

NIOSH (RTECS) Number: 9999999ZZ

CAS Number: N/K

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Other Recommended Limit: N/K

Proprietary: NO

Ingredient: FIRST AID PROC:& TOUCHING BACK OF THROAT W/FINGER OR BLUNT
OBJECT OR BY GIVING SYRUP OF IPECAC. NEVER GIVE (ING 9)

Ingredient Sequence Number: 08

Percent: N/K

Ingredient Action Code:

Ingredient Focal Point: N

NIOSH (RTECS) Number: 9999999ZZ

CAS Number: N/K

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Other Recommended Limit: N/K

Proprietary: NO

Ingredient: ING 8:ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MD.

Ingredient Sequence Number: 09

Percent: N/K

Ingredient Action Code:

Ingredient Focal Point: N

NIOSH (RTECS) Number: 9999999ZZ

CAS Number: N/K

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

316170

Proprietary: NO
Ingredient: SPILL PROC:MATL, METAL TO METAL CNTCT, IMPACT W/SHARP OBJECTS,
FRICTION OR OTHER SITUATIONS WHICH MAY INITIATE (ING 11)
Ingredient Sequence Number: 10
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 10:THE EXPLOSIVE. AVOID SAND, GLASS, FRIT, & METAL
FRAGMENTS WHICH MAY SENSIT MATL TO IMPACT &/OR (ING 12)
Ingredient Sequence Number: 11
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 11:FRICTION. WET WITH WATER TO DESENSITIZE.
Ingredient Sequence Number: 12
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: OTHER PREC:WHERE EXPLOS W/SPARK ENERGIES FOR INITIATION NOT
>0.02 JULES ARE HNDLD, RELATIVE HUMIDITY SHOULD BE (ING 14)
Ingredient Sequence Number: 13
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 13:>/=50%. DUST GENERATED BY HNDLG MUST BE CLEANED UP ON
CONTINUING BASES. CAUTION:EXPLOS MUST BE TESTED FOR(ING 15)

316171

Ingredient Sequence Number: 14
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 14:COMPAT W/ANY MATLS WHICH THEY CNTCT. MATLS INCL OTHER
EXPLOS, SOLVS, ADHESIVES, METALS, PLASTICS, PAINTS, (ING 16)
Ingredient Sequence Number: 15
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 15:CLEANING CMPD, FLOOR & TABLE COVERINGS, PACKING MATLS,
& OTHER SIMILAR MATLS & EQUIP. KEEP CNTNR CLOSED. (ING 17)
Ingredient Sequence Number: 16
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 16:WASH THORO AFTER HNDLG. WASH CONTAM CLTHG BEFORE REUSE.
EXTREME CARE SHOULD BE TAKEN DURING MAINTENANCE (ING 18)
Ingredient Sequence Number: 17
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 17:OF EXPLO CONTAM EQUIP. DECONTAM PROC INCL WASHING/
STEAMING, CHEM DECONTAM, & THERM DECONTAM. DECONTAM (ING 19)
Ingredient Sequence Number: 18
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ

CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 18:BE PERFORMED PRIOR TO WELDING, CUTTING/GRINDING METAL PARTS. PENETRATING OIL SHOULD BE USED LIBERALLY ON (ING 20)
Ingredient Sequence Number: 19
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 19:NUTS/BOLTS, & ALL THREADED CONNECTIONS TO AID IN DESENSIT HIDDEN EXPLOS PRIOR TO DISASSEMBLY.
Ingredient Sequence Number: 20
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: WASTE DISP METH:EXPLOS SHOULD BE IGNIT REMOTELY.PERS SHOULD WEAR FLAME RESIST CLTHG.DISP OF EXPLOS SHOULD COMPLY(ING 22)
Ingredient Sequence Number: 21
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 21:WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS PERTAINING TO CLASS A EXPLOSIVES.
Ingredient Sequence Number: 22
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 22:TO AVIOD HUMAN STATIC DISCHARGE. SAFETY SHOWER, EYE **316173**
BATH & WASHING FACILITIES SHOULD BE AVAIL. AS PREC, (ING 24)
Ingredient Sequence Number: 23
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: ING 23:HANDLE ONLY IN WELL-VENT AREAS, CHANGE CLTHG DAILY,
BATHE AT END OF WORK PERIOD & WASH HANDS THORO AFTER HNDLG.
Ingredient Sequence Number: 24
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: 9999999ZZ
CAS Number: N/K
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: N/K
=====

Physical/Chemical Characteristics

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Appearance And Odor: WHITE, CRYSTALLINE, ODORLESS SOLID
Boiling Point: N/A
Melting Point: 401F,205C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.8 (H*20=1)
Decomposition Temperature: N/K
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: N/A
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:
=====

Fire and Explosion Hazard Data

=====

Flash Point: NOT APPLICABLE
Flash Point Method: N/K
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: WATER SPRINKLER/DELUGE SYSTEM RECOMMENDED.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP
(FP N). DO NOT ATTEMPT TO MANUALLY EXTING FIRES. BURNING EXPLO MAY
ACCELERATE TO DETONATION AT ANY TIME (ING 3)
Unusual Fire And Expl Hazrds: MUST NOT BE CONFINED IF BURNING. CONFINEMENT

CAN CAUSE DEFLAGRATION/TRANSITION TO DETONATION W/EXTREMELY VIOLENT RSLTS.
EXPLO MAY BE RETAINED IN (SUPP DATA)

=====

Reactivity Data

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Stability: YES

Cond To Avoid (Stability): SHOCK, HEAT, ELECTROSTATIC DISCHARGE, IMPACT, IMPINGEMENT & FRICTION. HIGH EXPLO WILL DETONATE WHEN EXPOSED TO (ING 6)

Materials To Avoid: AVOID ALKALIS, PARTICULARLY AT ELEVATED TEMPERATURES, STRONG ACIDS & PHYSICAL SENSITIZERS SUCH AS GLASS, SAND, (ING 7)

Hazardous Decomp Products: DURING DECOMPOSITION TOXIC VAPORS ARE EMITTED.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT.

=====

Health Hazard Data

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LD50-LC50 Mixture: LD50:(ORAL RAT) 100 MG/KG.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: SKIN/EYE:CAN CAUSE ALLERGIC SKIN REACTION.

CAN CAUSE EYE IRRITATION. AVOID PROLONGED CONTACT WITH SKIN. AVOID CONTACT WITH EYES. INHAL/INGEST:CHRONIC EXPOSURE TO RDX DUST HAS BEEN REPORTED TO CAUSE CONVULSIONS OR UNCONSCIOUSNESS. CHRONIC LOCAL AND SYSTEMIC EFFECTS ARE NOT FULLY KNOWN. INHALATION (EFTS OF OVEREXPOSURE)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT.

Signs/Symptoms Of Overexp: HLTH HAZ:AND INGESTION CAN RESULT IN SYSTEMIC POISONING, USUALLY AFFECTING THE BONE MARROW (BLOOD-CELL PRODUCING SYSTEM) AND THE LIVER. AVOID INHALATION AND INGESTION OF DUST.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYE:FLUSH THORO W/LRG AMTS OF LOW PRESS WATER FOR AT LEAST 15 MINS. REMOVE CNTCT LENSES. GET MD. SKIN:WASH W/SOAP & RUNNING WATER. CLEAN CLTHG THORO & DISP OF SHOES CONTAM W/EXPLO I/A/W EXPLO DISP PROC. GET MD FOR RASH/IRRIT. INHAL:REMOVE TO FRESH AIR, TREAT ANY IRRIT SYMPTOMATICALLY. IF BRTHG DFCLT, GIVE O*2. GET MD. INGEST:IN CONSCIOUS, INDUCE VOMIT IMMED BY GIVING 1-2 GLASSES OF WATER (ING 8)

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: CLEAN UP SPILLS IMMED USING SOFT BRISTLE BRUSH & CONDUCTIVE RUBBER PAN/RUBBER SHOVEL. USE CONDUCTIVE CNTNRS & GROUND ALL CNTNRS BEFORE TRANSFERRING EXPLO BETWEEN CNTNRS. TREAT LIKE FLAMM SOLV W/REGARD TO ELECTROSTATIC DISCHARGE. AVOID PINCHING(ING 10)

Neutralizing Agent: NONE SPECIFIED BY MANUFACTUER.

Waste Disposal Method: EXPLOS SHOULD BE DESTROYED BY OPEN BURNING, BY BURNING IN APPRVD INCIN, OR BY CHEM TREATMENT W/CAUSTICS. THE DISP SITE SHOULD BE LOCATED TO PROVIDE ADEQ QTY-DISTANCE PROT FOR ADJACENT FACILITIES & PERS. EXPLOS SHOULD NOT BE BURNED IN CNTNRS. (ING 21)

Precautions-Handling/Storing: HIGH EXPLOSIVES SHOULD BE STORED IN APPRVD EXPLOSIVES MAGAZINES I/A/W AMCR 385-100. DUST GENERATED BY HNDLG MUST BE CLEANED UP ON A CONTINUING BASIS.

Other Precautions: STORAGE/HANDLING MUST BE CARRIED OUT I/A/W APPROP SAFETY AGENCY REGS CONCERNING QTY, DISTANCE, BARRICADING, PERS EXPOS & MATL HANDLING EQUIP. RECYCLE OR DISP OF USED CNTNRS I/A/W APPROP SAFETY AGENCY

Control Measures

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS AND PARTICULATES IF EXPOSED TO DUSTING.

Ventilation: LOCAL EXHAUST:HOODS FOR DUSTY OPERATIONS ARE REQUIRED. MECH: GENERAL, MODERATE. SPECIAL:DUST COLLECTION EQUIPMENT REQ.

Protective Gloves: IMPERVIOUS GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: CAPS & COVERALLS FOR FULL BODY (ARMS & LEGS) PROT ARE REC. COTTON UNDERWEAR, SOCKS, & CONDUCTIVE SHOES ARE REC (ING 23)

Work Hygienic Practices: AS PREC, HANDLE ONLY IN WELL-VENT AREAS, CHANGE CLTHG DAILY, BATHE AT END OF WORK PERIOD, WASH HANDS THOROR AFTER HNDLG.

Suppl. Safety & Health Data: EXPLO HAZ:FISSURES, CRACKS/CREVICES OF STRUCTURES, EQUIP & CNTNRS WHICH HAVE BEEN EXPOSED TO EXPLOSIVES. PROPERTY WHICH MAY BE CONTAM BY EXPLO MUST NOT BE SUBJECTED TO HEAT, SPARKS, OPEN FLAME. DETONATION CAN OCCUR. THERMAL DECONTAM UNDER CNTRLD CNDTNS ID REC METH FOR COMPLETE DECONTAM. THERMAL DECONTAMINATION (ING 2)

FSC: 6810

NIIN: 010972020

Manufacturer's CAGE: 47695

Part No. Indicator: A

Part Number/Trade Name: PERCHLOROETHYLENE

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General Information

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Item Name: TETRACHLOROETHYLENE, TECHNICAL

Manufacturer's Name: PPG INDUSTRIES INC

Manufacturer's Street: ONE PPG PLACE

Manufacturer's P. O. Box:

Manufacturer's City: PITTSBURGH

Manufacturer's State: PA

Manufacturer's Country: US

Manufacturer's Zip Code: 15272

Manufacturer's Emerg Ph #: 304-843-1300

Manufacturer's Info Ph #: 304-843-1300

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 003

Tot Safety Entries This Stk#: 012

Status: SE

Date MSDS Prepared: 16NOV93

Safety Data Review Date: 02MAR94

Supply Item Manager: CX

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BSSKQ

Specification Number: O-T-236

Spec Type, Grade, Class: GRADE A

Hazard Characteristic Code: T4

Unit Of Issue: CN

Unit Of Issue Container Qty: 5.0 GAL

Type Of Container: CAN

Net Unit Weight: 66.7 LBS

NRC/State License Number: NOT RELEVANT

Net Explosive Weight:

Net Propellant Weight-Ammo: N/R

Coast Guard Ammunition Code:

316177

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: PERCHLOROETHYLENE (TETRACHLOROETHYLENE) (SARA III)
Ingredient Sequence Number: 01
Percent: >99
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: KX3850000
CAS Number: 127-18-4
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM/100STEL,A3;94
Other Recommended Limit: NONE RECOMMENDED

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR COLORLESS LIQUID WITH ETHER-LIKE ODOR
Boiling Point: 250F,121C
Melting Point: -8F,-22C
Vapor Pressure (MM Hg/70 F): 14.2 @ 68F
Vapor Density (Air=1): 5.83
Specific Gravity: 1.6
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 0.09 (ETHYL ETHER = 1)
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100
Viscosity:
pH: N/R
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: NONE
Flash Point Method: N/R
Lower Explosive Limit: N/R
Upper Explosive Limit: N/R
Extinguishing Media: WATER SPRAY, CO2, DRY CHEMICAL. WATER SPRAY MAY BE USED TO KEEP FIRE EXPOSED CONTAINERS COOL & FLUSH SPILLS AWAY.
Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.
Unusual Fire And Expl Hazrds: COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): HIGH HEAT, OPEN FLAMES, HOT GLOWING SURFACES OR ELECTRIC ARCS
Materials To Avoid: NONE
Hazardous Decomp Products: MAY FORM HYDROGEN CHLORIDE GAS AND PHOSGENE.
Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LC50 (RAT) 4000 PPM (4 HOURS)

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: ACUTE- INHALE:CNS DEPRESSANT & CNS DAMAGE WITH OVEREXPOSURE. EYE:CAN CAUSE PAIN & IRRITATION. SKIN:PROLONGED/REPEATED CONTACT CAN CAUSE DERMATITIS. CAN BE ABSORBED THROUGH SKIN. INGESTION CAN CAUSE GI IRRITATION. ASPIRATION HAZARD. CHRONIC- DERMATITIS, LIVER & KIDNEY DAMAGE. TARGET ORGANS:CNS, LIVER, KIDNEY, EYE, LUNG.

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: IARC REPORTS "INADEQUATE EVIDENCE". POSSIBLE CANCER HAZARD.

Signs/Symptoms Of Overexp: EYES, SKIN, RESPIRATORY & GASTROINTESTINAL TRACTS IRRITATION, HEADACHE, DIZZINESS, NAUSEA, LOSS OF COORDINATION, VOMITING, PULMONARY EDEMA, UNCONSCIOUSNESS, DEATH

Med Cond Aggravated By Exp: PRE-EXISTING SKIN DISORDERS

Emergency/First Aid Proc: GET MEDICAL ATTENTION IF SYMPTOMS PERSIST.

SKIN:WASH WITH SOAP & WATER. EYE:FLUSH WITH WATER FOR 15 MINUTES, HOLDING EYELIDS OPEN. INHALED:REMOVE TO FRESH AIR & PROVIDE OXYGEN/CPR IF NEEDED.

ORAL:IF CONSCIOUS, DRINK LARGE AMOUNT OF WATER. DO NOT INDUCE VOMITING. CALL A PHYSICIAN OR POISON CONTROL CENTER.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: STOP LEAK IF POSSIBLE. WEAR PROTECTIVE EQUIPMENT. CONTAIN LIQUID. CLEAN UP SPILLS USING VERMICULITE, SAWDUST OR OTHER SUITABLE ABSORBENT MATERIALS. SWEEP INTO CLOSED CONTAINERS. REMOVE AFFECTED SOILS FOR DISPOSAL. DO NOT FLUSH TO SEWER.

Neutralizing Agent: NONE

Waste Disposal Method: PLACE CONTAMINATED MATERIAL IN IMPERVIOUS CONTAINERS. DISPOSE BY INCINERATION OR CONTRACT WITH LICENSED CHEMICAL WASTE DISPOSAL AGENCY. DISCHARGE, TREATMENT OR DISPOSAL MAY BE SUBJECT TO FEDERAL, STATE AND LOCAL REGULATIONS. RQ IS 100 LBS.

Precautions-Handling/Storing: STORE IN A CLOSED CONTAINER AWAY FROM HOT GLOWING SURFACES/ELECTRIC ARCS. AVOID ENVIRONMENTAL CONTAMINATION.

Other Precautions: DO NOT GET IN EYES, ON SKIN OR CLOTHING. DO NOT TAKE INTERNALLY. USE ONLY WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. VAPORS HEAVIER THAN AIR AND CAN ACCUMULATE IN LOW AREAS. KEEP OUT OF REACH OF CHILDREN.

Control Measures

Respiratory Protection: IF ENGINEERING CONTROLS ARE INADEQUATE TO CONTROL VAPOR CONCENTRATIONS TO AN ACCEPTABLE LEVEL, A NIOSH-APPROVED ORGANIC VAPOR RESPIRATOR SHOULD BE WORN. A PROGRAM SHOULD BE INSTITUTED TO ASSURE COMPLIANCE WITH OSHA STANDARD 29 CFR 1910.134.

Ventilation: USE LOCAL EXHAUST VENTILATION TO KEEP EXPOSURE BELOW PERMISSIBLE LIMITS.

Protective Gloves: POLYVINYL ALCOHOL (PVA), VITON

Eye Protection: CHEMICAL SAFETY GOGGLES+FULL FACE SHIELD

Other Protective Equipment: EYEWASH FACILITY & EMERGENCY SHOWER SHOULD BE

IN CLOSE PROXIMITY. STANDARD WORK CLOTHING AND SHOES.

Work Hygienic Practices: DO NOT INHALE VAPORS. USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT.

Suppl. Safety & Health Data: NOTE TO PHYSICIAN: ONLY ADMINISTER ADRENALINE AFTER CAREFUL CONSIDERATION FOLLOWING PERCHLOROETHYLENE OVEREXPOSURE. INCREASED SENSITIVITY OF THE HEART TO ADRENALINE MAY BE CAUSED BY OVEREXPOSURE TO PERCHLOROETHYLENE.

316179

316180

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 00N017590

Manufacturer's CAGE: 5Y748

Part No. Indicator: A

Part Number/Trade Name: TOLUENE

General Information

Item Name:

Manufacturer's Name: CAMBRIDGE ISOTOPE LABS

Manufacturer's Street: 20 COMMERCE WAY

Manufacturer's P. O. Box:

Manufacturer's City: WOBURN

Manufacturer's State: MA

Manufacturer's Country: US

Manufacturer's Zip Code: 01801

Manufacturer's Emerg Ph #: 800-322-1174

Manufacturer's Info Ph #: 617-938-0067

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 26JUN91

Safety Data Review Date: 06SEP91

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BLXNB

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: N/

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

316181

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM/150 STEL
ACGIH TLV: 50 PPM; 9293
Other Recommended Limit: N/K

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 232F, 111C
Melting Point: -135F, -93C
Vapor Pressure (MM Hg/70 F): 22
Vapor Density (Air=1): 3.2
Specific Gravity: 0.867
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: N/K
Percent Volatiles By Volume: N/K
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

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Fire and Explosion Hazard Data

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Flash Point: 40.0F, 4.4C
Flash Point Method: N/K
Lower Explosive Limit: 1 %
Upper Explosive Limit: 7 %
Extinguishing Media: CO*2, DRY CHEMICAL POWDER, ALCOHOL/POLYMER FOAM.
WATER MAY BE EFFECTIVE FOR COOLING, BUT NOT EFFECTIVE EXTINGUISHMENT.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND PROTECTIVE
EQUIPMENT TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: DANGER: EXTREMELY FLAMMABLE. VAPOR MAY
TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.
CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: OXIDIZING AGENTS. IRON OR FERRIC CHLORIDE CATALYZES A
VIGOROUS EXOTHERMIC RXN BETWEEN TOLUENE & SULFUR DICHLORIDE.
Hazardous Decomp Products: TOXIC FUMES OF CARBON MONOXIDE AND CARBON
DIOXIDE.

Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

316182

Health Hazard Data

LD50-LC50 Mixture: LD50: (ORAL,RAT) 5000 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. CAUSES SKIN IRRITATION. SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA & (SEE EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT

Signs/Symptoms Of Overexp: HLTH HAZ: VOMITING. EXPOSURE CAN CAUSE LUNG IRRITATION, CHEST PAIN AND EDEMA WHICH MAY BE FATAL. CHRONIC: DAMAGE TO THE LIVER. BLOOD EFFECTS. DAMAGE TO THE KIDNEYS. MAY CAUSE NERVOUS SYSTEM DISTURBANCES. EXPOSURE TO AND/OR CONSUMPTION OF ALCOHOL MAY INCREASE TOXIC EFFECTS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYES/SKIN: FLUSH WSITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MIN WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION, IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. WASH CONTAMINATED CLOTHING BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. SHUT OFF ALL SOURCES OF IGNITION. WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. COVER WITH AN ACTIVATED CARBON ADSORBENT, TAKE UP AND PLACE IN CLOSED CONTAINERS. TRANSPORT OUTDOORS.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE. OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS.

Precautions-Handling/Storing: KEEP TIGHTLY CLOSED. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. STORE UNDER NITROGEN. STORE IN COOL DRY PLACE.

Other Precautions: DO NOT BREATHE VAPOR. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. AVOID PROLONGED OR REPEATED EXPOSURE. READILY ABSORBED THROUGH SKIN. THIS PRODUCT IS SUBJECT TO SARA TITLE III, SEC 313 REQUIREMENTS.

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation: MECHANICAL EXHAUST REQUIRED.

Protective Gloves: CHEMICAL RESISTANT GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: SAFETY SHOWER AND EYE BATH. OTHER PROTECTIVE CLOTHING AS REQUIRED.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Ingredients/Identity Information

Proprietary: NO
 Ingredient: TRICHLOROETHYLENE (SARA III)
 Ingredient Sequence Number: 01
 Percent: 100
 Ingredient Action Code:
 Ingredient Focal Point: D
 NIOSH (RTECS) Number: KX4550000
 CAS Number: 79-01-6
 OSHA PEL: 100 PPM/100 STEL
 ACGIH TLV: 50 PPM/100, A5STEL; 93
 Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS LIQUID, ETHER-LIKE ODOR
 Boiling Point: 189F, 87C
 Melting Point: UNKNOWN
 Vapor Pressure (MM Hg/70 F): 57.8 MM
 Vapor Density (Air=1): 4.54
 Specific Gravity: 1.465
 Decomposition Temperature: UNKNOWN
 Evaporation Rate And Ref: 0.28 (ETHYL ETHER = 1)
 Solubility In Water: 0.11%
 Percent Volatiles By Volume: 100
 Viscosity: UNKNOWN
 pH: N/K
 Radioactivity:
 Form (Radioactive Matl):
 Magnetism (Milligauss):
 Corrosion Rate (IPY): UNKNOWN
 Autoignition Temperature:

Fire and Explosion Hazard Data

Flash Point: NONE (DOT TEST)
 Flash Point Method: N/R
 Lower Explosive Limit: 7.8
 Upper Explosive Limit: 52
 Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, OR DRY CHEMICAL.
 Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
 Unusual Fire And Expl Hazrds: VAPORS CONCENTRATED IN A CONFINED OR POORLY VENTILATED AREA CAN BE IGNITED BY A HIGH ENERGY SPARK FLAME OR HIGH INTENSITY SOURCE OF HEAT.

Reactivity Data

Stability: YES
 Cond To Avoid (Stability): HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES
 Materials To Avoid: STRONG OXIDIZING AGENTS, CAUSTICS
 Hazardous Decomp Products: HYDROGEN CHLORIDE GAS OR POSSIBLY SOME PHOSGENE
 Hazardous Poly Occur: NO
 Conditions To Avoid (Poly): NOT RELAVANT

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

316184

FSC: 6810

NIIN: 001844794

Manufacturer's CAGE: 47695

Part No. Indicator: A

Part Number/Trade Name: TRICHLOROETHYLENE

General Information

Item Name: TRICHLOROETHYLENE, TECHNICAL

Manufacturer's Name: PPG INDUSTRIES INC

Manufacturer's Street: 1 PPG PL

Manufacturer's P. O. Box:

Manufacturer's City: PITTSBURGH

Manufacturer's State: PA

Manufacturer's Country: US

Manufacturer's Zip Code: 15272

Manufacturer's Emerg Ph #: 304-843-1300

Manufacturer's Info Ph #: 304-843-1300

Distributor/Vendor # 1: AMCO CHEMICAL CORP

Distributor/Vendor # 1 Cage: 97984

Distributor/Vendor # 2: C S D INC.

Distributor/Vendor # 2 Cage: 4N760

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 008

Status: SE

Date MSDS Prepared: 31JUL90

Safety Data Review Date: 25FEB91

Supply Item Manager: CX

MSDS Preparer's Name: R. KENNETH LEE

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BDGXX

Specification Number: O-T-634C

Spec Type, Grade, Class: TY II

Hazard Characteristic Code: T4

Unit Of Issue: CN

Unit Of Issue Container Qty: 5 GALLONS

Type Of Container: CAN

Net Unit Weight: 61.1 LBS

NRC/State License Number: N/R

Net Explosive Weight:

Net Propellant Weight-Ammo: N/R

Coast Guard Ammunition Code:

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Health Hazard Data

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316185

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LD50-LC50 Mixture: ORAL RAT LD50 IS 4900 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: TRICHLOROETHYLENE IS IRRITATING TO BODY TISSUES. IF INHALED, IT DEPRESSES THE CENTRAL NERVOUS SYSTEM AND MAY EVEN IN EXTREME CASES CAUSE DEATH. CHRONIC OVEREXPOSURE MAY RESULT IN LIVER AND/OR KIDNEY DAMAGE.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: IARC REPORTS TRICHLOROETHYLENE AS CLASS 3; INSUFFICIENT EVIDENCE. CALIFORNIA 'KNOWS' TRICHLOROETHYLENE CAUSES CANCER.

Signs/Symptoms Of Overexp: EYE:IRRITATION SKIN:IRRITATION,DERMITITIS. INHALED:RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, HEAD ACHE, LOSS OF EQUILIBRIUM, POSSIBLE CENTRAL NERVOUS SYSTEM DAMAGE. INGESTED:G/I IRRITATION,EFFECTS SIMILAR TO INHALED, ASPIRATION INTO THE LUNGS DURING VOMITING MAY CAUSE PULMONARY EDEMA.

Med Cond Aggravated By Exp: NONE GIVEN BY MANUFACTURER (SUPPLIER).

Emergency/First Aid Proc: EYE:FLUSH W/WATER 15 MIN, HOLD LIDS OPEN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDRER BEFORE REUSE. INHALED:REMOVE TO FRESH AIR. RESTORE BREATHING IF NECESSARY. INGESTED:DO NOT INDUCE VOMITING. GIVE 2 LARGE GLASSES WATER AND GET IMMEDIATE MEDICAL CARE. GIVE NOTHING BY MOUTH IF UNCONSCIOUS. IF IRRITATION PERSISTS OR IS SEVERE,SEE A DOCTOR.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE AND VENTILATE AREA. ADSORB ON INERT MATERIAL SUCH AS SAWDUST OR VERMICULITE. SHOVEL INTO CLOSED CONTAINERS FOR DISPOSAL. DO NOT ALLOW TO ENTER SEWER OR DRAIN.

Neutralizing Agent: NONE

Waste Disposal Method: DISPOSE I/A/W ALL FEDERAL, STATE AND LOCAL REGULATIONS. MANUFACTURER SUGGESTS THAT DISPOSAL MAY BE DONE BY REPROCESSING OR INCINERATION.

Precautions-Handling/Storing: STORE IN A COOL, DRY AREA. KEEP TIGHTLY COLSED WHEN NOT IN USE. USE ONLY IN A WELL VENTILATED AREA. VAPORS ARE HEAVIER THAN AIR AND WILL COLLECT.

Other Precautions: 'EMPTY' CONTAINERS MAY CONTAIN RESIDUE OR VAPOR. TREAT THEM WITH THE RESPECT DUE FULL ONES. DO NOT CUT,WELD,ETC. ON THEM.

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Control Measures

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Respiratory Protection: RESPIRATOR WILL NOT NORMALLY BE NECESSARY. USE NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR OR RESPIRATOR FOR ORGANIC MIST/VAPOR IF EXPOSURE IS ABOVE THE TLV/PEL. SEE 29 CFR 1910.134 FOR REGULATIONS PERTAINING TO RESPIRATOR USE.

Ventilation: NORMAL ROOM VENTILATION MAY BE SUFFICIENT (CHECK PEL TO BE SURE). SUPPLEMENT WITH LOCAL EXHAUST IF PEL/TLV IS EXCEEDED.

Protective Gloves: VITON, POLY VINYL ALCOHOL

Eye Protection: SAFETY GLASSES OR SPLASH GOGGLES

Other Protective Equipment: BOOTS, APRONS, ETC. AS NEEDED TO PREVENT SKIN CONTACT

Work Hygienic Practices: USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID

UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING. **316186**
Suppl. Safety & Health Data: NEW JERSEY RIGHT-TO-KNOW: ALSO CONTAINS
BUTYLENE OXIDE.

DOD Hazardous Materials Information System

316187

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

FSC: 6810

NIIN: 00N034925

Manufacturer's CAGE: OFB11

Part No. Indicator: A

Part Number/Trade Name: VINYL CHLORIDE

General Information

Item Name:

Manufacturer's Name: MATHESON GAS PRODUCTS

Manufacturer's Street: 932 PATTERSON PLANK RD

Manufacturer's P. O. Box:

Manufacturer's City: EAST RUTHERFORD

Manufacturer's State: NJ

Manufacturer's Country: US

Manufacturer's Zip Code: 07073

Manufacturer's Emerg Ph #: 201-933-2400

Manufacturer's Info Ph #: 201-933-2400

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: N

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 00OCT85

Safety Data Review Date: 09OCT92

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company:

Preparer's St Or P. O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Other MSDS Number:

MSDS Serial Number: BQCBT

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code: NK

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

NRC/State License Number:

Net Explosive Weight:

Net Propellant Weight-Ammo:

Coast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

316188

Proprietary: NO
Ingredient: ETHYLENEM, CHLORO-; (VINYL CHLORIDE) (SARA III)
Ingredient Sequence Number: 01
Percent: N/K
Ingredient Action Code:
Ingredient Focal Point: N
NIOSH (RTECS) Number: KU9625000
CAS Number: 75-01-4
OSHA PEL: SEE 1910.1017
ACGIH TLV: 5 PPM, A1; 9293
Other Recommended Limit: N/K

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: COLORLESS, HIGHLY FLAMM GAS WITH A PLEASANT, SWEET
ODOR AT HIGH CONC.
Boiling Point: 7.2F, -13.8C
Melting Point: -245F, -154C
Vapor Pressure (MM Hg/70 F): 234KPA@21C
Vapor Density (Air=1): N/K
Specific Gravity: 2.21
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: 1.07 CM3/1 ML H*2O
Percent Volatiles By Volume: N/K
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: N/K
Flash Point Method: N/K
Lower Explosive Limit: 4%
Upper Explosive Limit: 22%
Extinguishing Media: TO EXTING A VINYL CHLORIDE FIRE STOP THE FLOW OF GAS.
IF THE FLOW CANNOT BE STOPPED, LET THE FIRE BURN ITSELF(SUPP DATA)
Special Fire Fighting Proc: FIRE FIGHTERS MUST WEAR NIOSH/MSHA APPROVED
SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). FIREIGHTERS TURNOUT GEAR IS
INADEQUATE.
Unusual Fire And Expl Hazrds: CYLINDERS THAT ARE EXPOSED TO FIRE MAY
RUPTURE WITH VIOLENT FORCE. EXTING SURROUNDING FIRE & KEEP CYLINDERS COOL
USING A WATER SPRAY APPLIED FROM THE(SUPP DATA)

=====

Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): AVOID EXPOSURE TO SUNLIGHT, HEAT, AIR, OXYGEN
PEROXIDES AND OTHER STRONG OXIDIZING AGENTS.
Materials To Avoid: OXIDIZING MATLS, ACTIVE METALS, ALUMINUM ALLOYS AND

ORGANOMETALLICS.

Hazardous Decomp Products: HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE.

Hazardous Poly Occur: YES

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Conditions To Avoid (Poly): OXYGEN (AIR), HEAT, SUNLIGHT, MOISTURE AND FREE RADICAL INITIATORS OR OTHER CATALYTIC MATERIALS.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: INHAL MAY CAUSE DROWS, BLURRED VISION, STAG GAIT, & TINGLING & NUMBNESS IN THE FEET & HANDS. IN HIGH CONC VINYL CHLORIDE ACTS AS AN ANESTHETIC. CONTACT WITH LIQ VINYL CHLORIDE MAY CAUSE SEVERE IRRITATION & BURNS. CHRONIC: VINYL CHLORIDE IS A RECOGNIZED CARCINOGEN & HAS CAUSED CANCER IN MAN. (EFTS OF OVEREXP)

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: YES

Explanation Carcinogenicity: VINYL CHLORIDE: KNOWN CARCINOGEN (NTP), GROUP 1 (IARC); OSHA REGULATED

Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: INHAL: MOVE VICTIM TO FRESH AIR. IF NOT BRTHG, GIVE ARTF RESP. IF BRTHG IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

EYE/SKIN: IMMED FLUSH EYE/SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MIN.

REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN. INGEST: GET MD IMMEDIATELY (FP N). NOTE: SKIN BURNS CAN BE TREATED BY THE APPLICATION OF MAGNESIUM PASTE (MAGNESIUM OXIDE AND GLYCERINE).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. PERSONNEL EQUIPPED W/SPECIAL PERSONAL PROTECTIVE SUITS FOR FIRE/CHEMICALS AND POSITIVE PRESSURE NIOSH/MSHA APPROVED SCBA CAN RE-ENTER THE AREA AND ATTEMPT TO STOP LEAK.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: CYLINDERS SHOULD BE STORED AND USED IN DRY, WELL VENT AREAS AWAY FROM SOURCES OF HEAT OR IGNITION. DO NOT STORE WITH OXIDIZERS.

Other Precautions: BEFORE USING: 1) SECURE CYLINDER TO PVNT IT FROM FALLING OR BEING KNOCKED OVER. 2) INSTALL CHECK VALVES/TRAPS TO PVNT SUCKBACK TO CYLNDER. 3) LEAK CHECK LINES & EQUIP. 4) HAVE APPRVD RESP PROT & OTHER PROT EQUIP. 5) HAVE AN EMER (SUPP DAT

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED POSITIVE PRESSURE SCBA SHOULD BE WORN IF IT IS SUSPECTED THAT VINYL CHLORIDE IS IN THE AIR.

Ventilation: NONE SPECIFIED BY MANUFACTURER.

Protective Gloves: IMPERVIOUS GLOVES.

Eye Protection: CHEM WORK GOGG/FULL LENGTH FSHLD (FP N).

Other Protective Equipment: EYE WASH STATIONS & SAFETY SHOWERS READILY AVAILABE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

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Suppl. Safety & Health Data: EXTING MEDIA:OUT WHILE COOLING CYLINDER & SURROUNDINGS USING A H*2O SPRAY. EXPLO HAZ:MAX POSS DISTANCE. FLAMM & TOX GASES MAY SPREAD FROM A SPILL AFTER FIRE IS EXTING & BE SUBJECT TO REIGNIT. THERMAL DECOMP PRODS MAY INCL HCL & PHOSGENE (FP N). OTHER PREC: PLAN COVERING STEPS TO BE TAKEN IN CASE OF ACCIDENTAL RELEASE.

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF August 1994

Proprietary Version - For U.S. Government Use Only

316191

FSC: 6810

NIIN: 002572479

Manufacturer's CAGE: 70829

Part No. Indicator: A

Part Number/Trade Name: XYLENES

General Information

Item Name: XYLENE, TECHNICAL

Manufacturer's Name: J.T.BAKER CHEMICAL CO.

Manufacturer's Street: 222 RED SCHOOL LANE

Manufacturer's P. O. Box: N/K

Manufacturer's City: PHILLIPSBURG

Manufacturer's State: NJ

Manufacturer's Country: US

Manufacturer's Zip Code: 08865-2219

Manufacturer's Emerg Ph #: 201-859-2151 OR 800-424-9300 (CHEMT

Manufacturer's Info Ph #: 201-859-2151

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: D

Record No. For Safety Entry: 004

Tot Safety Entries This Stk#: 006

Status: SM

Date MSDS Prepared: 11SEP86

Safety Data Review Date: 17OCT90

Supply Item Manager: CX

MSDS Preparer's Name: N/K

Preparer's Company: VWR SCIENTIFIC

Preparer's St Or P. O. Box: 3745 BAYSHORE BLVD

Preparer's City: BRISBANE

Preparer's State: CA

Preparer's Zip Code: 94005

Other MSDS Number:

MSDS Serial Number: BDPHN

Specification Number: ASTM-D-846

Spec Type, Grade, Class: N/K

Hazard Characteristic Code: F4

Unit Of Issue: PT

Unit Of Issue Container Qty: 16.0 FL OZ

Type Of Container: CAN

Net Unit Weight: 16.0 FL OZ

NRC/State License Number: N/R

Net Explosive Weight:

Net Propellant Weight-Ammo: N/R

Coast Guard Ammunition Code:

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Ingredients/Identity Information

Proprietary: NO
Ingredient: XYLENES (O-,M-,P- ISOMERS) (SARA III)
Ingredient Sequence Number: 01
Percent: 90-100
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA III)
Ingredient Sequence Number: 02
Percent: <1.0
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM/125 STEL
ACGIH TLV: 100 PPM/125STEL 9192
Other Recommended Limit: N/R

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID WITH SWEET PLEASANT ODOR.
Boiling Point: 279F/137C
Melting Point: -54F,-48C
Vapor Pressure (MM Hg/70 F): 5.1 MMHG
Vapor Density (Air=1): 3.7
Specific Gravity: 0.87
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 0.7(N-BUTYL ACETATE=1)
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100.0
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature:

Fire and Explosion Hazard Data

Flash Point: 80.0F,26.7C
Flash Point Method: C.C.
Lower Explosive Limit: 1.1
Upper Explosive Limit: 7.0
Extinguishing Media: WATER SPRAY,ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO

316193

COOL NEARBY CONTAINERS EXPOSED TO FIRE.

Unusual Fire And Expl Hazrds: AVOID EXTREME HEAT AND OXIDIZING SUBSTANCES;
CONTAINERS MAY EXPLODE.

=====
Reactivity Data
=====

Stability: YES

Cond To Avoid (Stability): HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES

Materials To Avoid: STRONG OXIDIZING AGENTS

Hazardous Decomp Products: CARBON MONOXIDE, CARBON DIOXIDE AND OTHER
UNIDENTIFIED COMPONENTS.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT APPLICABLE
=====

Health Hazard Data
=====

LD50-LC50 Mixture: LD50 (ORAL RAT) IS 4300 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE:IRRITATION OF EYES,SKIN,RESPIRATORY OR
G.I.TRACTS;CNS EFFECTS LIKE HEADACHE,DIZZINESS,NAUSEA AND VOMITING.

CHRONIC:DRYING OF SKIN,DEFATTING OR DERMATITIS,DAMAGE TO LUNGS,EYES,LIVER
OR KIDNEYS. .

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: DATA PER MSDS

Signs/Symptoms Of Overexp: MAY CAUSE IRRITATION OF EYES,SKIN, RESPIRATORY
OR G.I.TRACTS;MAY CAUSE HEADACHE,DIZZINESS,NAUSEA,VOMITING OR GI TRACT
DISTURBANCES POSSIBLE.BURNS OR REDNESS OF EYES/CRACKING OR DRYNESS OF SKIN.

Med Cond Aggravated By Exp: PERSONS WITH A HISTORY OF AILMENTS OR WITH A
PRE-EXISTING DISEASE INVOLVING THE EYES, SKIN, OR RESPIRATORY TRACT MAY BE
AT INCREASED RISK FROM EXPOSURE.

Emergency/First Aid Proc: INHALATION:REMOVE TO FRESH AIR. RESUSCITATE IF
NOT BREATHING. GET MEDICAL ATTENTION. EYES:IMMEDIATELY FLUSH WITH PLENTY OF
WATER FOR 15 MINUTES HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN:
REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IF IRRITATION
PERSISTS, GET MEDICAL ADVICE. INGESTION:DO NOT INDUCE VOMITING. GIVE
NOTHING BY MOUTH IF UNCONSCIOUS. GET IMMEDIATE MEDICAL ATTENTION.
=====

Precautions for Safe Handling and Use
=====

Steps If Matl Released/Spill: ELIMINATE IGNITION SOURCES. ABSORB SPILL ON
SAND,EARTH, OR VERMICULITE. CAREFULLY SWEEP UP & REMOVE. FLUSH SPILL AREA
W/WATER.ALTERNATIVELY USE J.T. BAKERS FLAMMABLE SOLVENT CLEAN-UP
KIT(PRODUCT 4437)

Neutralizing Agent: NOT APPLICABLE.

Waste Disposal Method: CONSULT LOCAL AUTHORITIES.DISPOSAL MUST BE MADE IN
ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND
REGULATIONS.

Precautions-Handling/Storing: KEEP AWAY FROM HEAT, SPARK, & FLAME. KEEP IN
TIGHTLY CLOSED CONTAINER

Other Precautions: DO NOT TAKE INTERNALLY. DO NOT BREATHE MIST. AVOID
PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID CONTACT WITH EYES. USE WITH
ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

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Control Measures

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR ORGANIC VAPORS/MIST IF ABOVE PEL/TLV.

Ventilation: LOCAL/GENERAL TO MAINTAIN PEL/TLV.

Protective Gloves: NEOPRENE, NITRILE, OR NATURAL RUBBER

Eye Protection: SAFETY GOGGLES WITH OPTIONAL FACE SHIELD

Other Protective Equipment: EYE WASH STATION AND SAFETY SHOWER, WORK CLOTHING AND APRON AS REQUIRED.

Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.

Suppl. Safety & Health Data: AVOID PROLONGED OR REPEATED EXPOSURE. DO NOT GET ON SKIN OR IN EYES. DO NOT BREATHE VAPORS OR MISTS.

APPENDIX K
AGREEMENT AND ACKNOWLEDGEMENT SHEET



HEALTH AND SAFETY PLAN AGREEMENT AND ACKNOWLEDGEMENT SHEET

TEC Health and Safety Program

INSTRUCTIONS: Field personnel are required to receive a copy of the final health and safety plan (HSP), and to read, understand, and agree to the provisions of the plan. The project manager (PM) has responsibility for distribution of the HSP to personnel as they are assigned to the project. Personnel are required to sign this form indicating receipt of the HSP. The original or this form is maintained by the PM and will become part of the permanent project files. Copies of this form will be sent to the health and safety manager. Updated copies are distributed as additional personnel are assigned to the site.

SITE NAME: _____

LOCATION: _____

I have received a copy, read, understood, and agree to comply with the provisions of the above referenced HSP for work activities on this project at this site.

PRINTED NAME

SIGNATURE

DATE _____

APPENDIX L
VISITOR/TRAINEE AGREEMENT FORM

TEC Health and Safety Program

SITE NAME: _____

LOCATION: _____

I have received a copy, read, understood, and agree to comply with the provisions of the above referenced HSP for work activities on this project at this site.

PRINTED NAME

SIGNATURE

DATE _____

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APPENDIX M
SITE TRAINING AND BRIEFING TOPICS

Training and Briefing Topics		
Site: NAS Fort Worth Weapons Storage Area		
Project and Operation: P3109 Soil Boring and Well Installation		Frequency
		Daily Periodic
Site Characteristics/Waste Types		
X	Site characterization and analysis, Sec. 3.0; 29 CFR 1910.120 i	X
X	Overhead and underground utilities	X
	Unguarded openings - wall, floor, ceilings	
X	Radioactive waste	X
	Shock sensitive waste	
	Laboratory waste packs	
Hazards		
X	Physical hazards (electrical, heat/cold, oxygen deficiency, noise, equipment, radiation, slips, trips, and falls)	X
X	Chemical hazards (corrosives, reactives, flammables, poisons, carcinogens, irritants, asphyxiants, anesthetics, sensitizers)	X
	Biological hazards (pathogens, hospital wastes, research materials)	
X	Animal bites, stings, and poisonous plants	X
X	Heat Stress	X
	Cold Stress	
Personal Protection/Site Operations		
X	Personal protective equipment, Sec. 5.0; 29 CFR 1910.120 g; 29 CFR 1910.134	X
X	Respiratory protection, Sec. 5.8; 29 CFR 1910.120 g; Z88.2-1980	X
	Level A (fully encapsulating suit w/SCBA, coveralls, gloves, boots, hardhat, 2-way radio communications)	
	Level B (positive-pressure supplied-air respirator, chemical resistant clothing, coveralls, gloves, boots, hardhat, 2-way radio communications)	
	Level C (air-purifying respirator, chemical resistant clothing, coveralls, boots, gloves, hardhat, escape mask, 2-way radio communications)	
X	Level D (coveralls, boots, gloves, safety glasses)	X
X	Monitoring, Sec. 7.0; 29 CFR 1910.120 h	X
Site Control/Decontamination		
X	Site control, Sec. 8.0; 29 CFR 1910.120 d	X
X	Engineering controls and safe work practices, Sec. 8.5; 29 CFR 1910.120 g (pressurized cabs or control booths on equipment, use of remotely operated equipment, removal of non-essential employees, locate personnel upwind of possible hazards)	X
X	Decontamination, Sec. 9.0; 29 CFR 1910.120 k	X
Emergency Response		
X	Emergency response, Sec. 10.0; 29 CFR 1910.120 l	X
X	Elements of an emergency response, Sec. 10.0; 29 CFR 1910.120 l	X
X	Procedures for handling site emergency incidents, Sec. 10.0; 29 CFR 1910.120 l	X
X	Offsite emergency response, 29 CFR 1910.120 l	X
X	Evacuation routes	X
X	Emergency signaling	X
Special Operations/Equipment		
	Heavy machinery (dozer, dump truck, backhoe, forklift, etc.)	
X	Drill rigs	X
X	*Mast 25 feet away from overhead utilities	X
X	*Verify location & operation of kill switches	X
X	*Outriggers, stabilizers, or jacks in place and drill rig level	X

Site: NAS Fort Worth Weapons Storage Area			
Project and Operation: P3109 Soil Boring and Well Installation		Frequency	
		Daily	Periodic
X	*Geophysical survey/utility maps to verify presence of buried objects, tanks, drums, underground utilities, etc.		X
X	*Filled eyewash bottle	X	
X	*Check condition of chains, cables, ropes	X	
X	*Safety belts available if mast climbing available	X	
X	HSP posted	X	
	Tools		
	Confined space		
	Ladder, 29 CFR 1910.27 d		
	Scaffolds		
	Structural integrity		
	Trenching		
	Pressurized air cylinders		
	Handling drums and containers, 29 CFR 1910.120 j		
	Opening drums and containers		
	Sampling drums and containers		
	Electrical material handling equipment		
	Shipping and transport, 49 CFR 172.101		
	Tank and vault procedures		
	Illumination, 29 CFR 1910.120 m		
	Sanitation, 29 CFR 1910.120 n		
X	First aid kit	X	
X	Fire extinguisher charged to proper pressure	X	
Other (Operations/Site Specific Requirements)			

Training and Briefing Topics			
Site: NAS Fort Worth Weapons Storage Area			
Project and Operation: P3109 Well Development and Sample Purging		Frequency	
		Daily	Periodic
Site Characteristics/Waste Types			
X	Site characterization and analysis, Sec. 3.0; 29 CFR 1910.120 i		X
	Overhead and underground utilities		
	Unguarded openings - wall, floor, ceilings		
X	Radioactive waste		X
	Shock sensitive waste		
	Laboratory waste packs		
Hazards			
X	Physical hazards (electrical, heat/cold, oxygen deficiency, noise, equipment, radiation, slips, trips, and falls)	X	
X	Chemical hazards (corrosives, reactives, flammables, poisons, carcinogens, irritants, asphyxiants, anesthetics, sensitizers)	X	
	Biological hazards (pathogens, hospital wastes, research materials)		
X	Animal bites, stings, and poisonous plants	X	
X	Heat Stress	X	
	Cold Stress		
Personal Protection/Site Operations			
X	Personal protective equipment, Sec. 5.0; 25 CFR 1910.120 g; 29 CFR 1910.134	X	
X	Respiratory protection, Sec. 5.8; 29 CFR 1910.120 g; Z88.2-1980		X
	Level A (fully encapsulating suit w/SCBA, coveralls, gloves, boots, hardhat, 2-way radio communications)		
	Level B (positive-pressure supplied-air respirator, chemical resistant clothing, coveralls, gloves, boots, hardhat, 2-way radio communications)		
	Level C (air-purifying respirator, chemical resistant clothing, coveralls, boots, gloves, hardhat, escape mask, 2-way radio communications)		
X	Level D (coveralls, boots, gloves, safety glasses)	X	
X	Monitoring, Sec. 7.0; 29 CFR 1910.120 h	X	
Site Control/Decontamination			
X	Site control, Sec. 8.0; 29 CFR 1910.120 d	X	
X	Engineering controls and safe work practices, Sec. 8.5; 25 CFR 1910.120 g (pressurized cabs or control booths on equipment, use of remotely operated equipment, removal of non-essential employees, locate personnel upwind of possible hazards)		X
X	Decontamination, Sec. 9.0; 29 CFR 1910.120 k	X	
Emergency Response			
X	Emergency response, Sec. 10.0; 29 CFR 1910.120 l	X	
X	Elements of an emergency response, Sec. 10.0; 29 CFR 1910.120 l		X
X	Procedures for handling site emergency incidents, Sec. 10.0; 29 CFR 1910.120 l		X
X	Offsite emergency response, 29 CFR 1910.120 l		X
X	Evacuation routes		X
X	Emergency signaling	X	
Special Operations/Equipment			
	Heavy machinery (dozer, dump truck, backhoe, forklift, etc.)		
	Drill rigs		
	*Must 25 feet away from overhead utilities		
	*Verify location & operation of kill switches		
	*Outriggers, stabilizers, or jacks in place and drill rig level		

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Site: NAS Fort Worth Weapons Storage Area		
Project and Operation: P3109 Well Development and Sample Purging		Frequency
		Daily Periodic
	*Geophysical survey/utility maps to verify presence of buried objects, tanks, drums, underground utilities, etc.	
	*Filled eyewash bottle	
	*Check condition of chains, cables, ropes	
	*Safety belts available if mast climbing available	
X	HSP posted	X
	Tools	
	Confined space	
	Ladder, 29 CFR 1910.27 d	
	Scaffolds	
	Structural integrity	
	Trenching	
	Pressurized air cylinders	
	Handling drums and containers, 29 CFR 1910.120 j	
	Opening drums and containers	
	Sampling drums and containers	
	Electrical material handling equipment	
	Shipping and transport, 49 CFR 172.101	
	Tank and vault procedures	
	Illumination, 29 CFR 1910.120 m	
	Sanitation, 29 CFR 1910.120 n	
X	First aid kit	X
	Fire extinguisher charged to proper pressure	
Other (Operations/Site Specific Requirements)		

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APPENDIX N
PRELIMINARY INCIDENT REPORT

PRELIMINARY INCIDENT REPORT

Attach a narrative summary of the incident, as appropriate.

NAME _____

SOCIAL SECURITY NUMBER _____

FIRM/REGION _____

DATE OF REPORT _____

SITE NAME _____ TASK/PHASE _____

INCIDENT TYPE: Possible Exposure [] Exposure Injury []

DATE OF INCIDENT _____ TIME _____

LOCATION _____

SITE CONDITIONS AT TIME OF INCIDENT:

Temperature _____ Wind Speed & Direction _____

Humidity _____ Cloud Cover _____

Precipitation _____ Other _____

TYPE OF EXPOSURE/INJURY:

MATERIAL EXPOSED TO (chemical compound name, physical state, etc.):

NATURE OF EXPOSURE/INJURY (parts of body exposed/injured, etc.):

MEDICAL CARE RECEIVED (when, where, by whom):

PRELIMINARY INCIDENT REPORT (Cont.)

HAS EXPOSURE/INJURY RESULTED IN:

Death ☐ Permanent Disability ☐ Temporary Disability ☐Loss of Work Time ☐ Other ☐

Explain: _____

OTHER INDIVIDUAL INVOLVED/AFFECTED:

WITNESSES:

POSSIBLE CAUSE OF INJURY/EXPOSURE:

WERE OPERATIONS CONDUCTED USING AN APPROVED HEALTH AND SAFETY PLAN?

YES () Reference _____

NO () Explain _____

WAS INJURY/EXPOSURE DUE TO FAILURE OF PROTECTIVE EQUIPMENT?

NO () YES ()

Explain: _____

HAS HSM BEEN NOTIFIED? NO() YES()

Employee Signature: _____ Date _____

HSM COMMENTS:

ACTIONS REQUIRED:

HSM _____ Date _____

PHYSICIAN'S COMMENTS:

Physician _____ Date _____

ACTIONS COMPLETED:

HSM _____ Date _____

APPENDIX O

**PROCEDURES FOR SOIL BORING ADVANCEMENT
(Hollow Stem Auger)**

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Soil borings will be advanced through overburden soils using a conventional truck-mounted drill rig. Borings will be completed using "dry" hollow-stem auger techniques from which soil samples will be taken. General hazards associated with borehole advancement include noise, electrical, chemical, heavy lifting, and use of heavy equipment. They are discussed in the following paragraphs

ELECTRICAL HAZARDS

Electrical hazards include electrical wires, buried cables, and generators; all pose a danger of shock or electrocution if contacted or severed during borehole advancement. Electrocution is the most common cause of job-related mortality for drillers and helpers. Contact with overhead wires or drilling into buried cables constitute the majority of cases; line arcing has been implicated in a few cases. To minimize electrical hazards, low-voltage equipment with ground-fault interrupters and water-tight corrosion-resistant connecting cables should always be used. A minimum of 20 feet should be maintained between drilling equipment and overhead wires. The distance may be increased depending upon local utility requirements and/or state and local regulations; distance requirements are often based on line voltage.

Underground utilities will be located before drilling operations commence. This will be through review of plans or geophysical methods. If soil borings are advanced in off-site locations, local utilities will be contacted regarding the location of buried cables.

PHYSICAL HAZARDS

Physical hazards include unstable slopes, uneven terrain, holes and ditches, steep grades, and mud-covered surfaces. The very act of drilling increases the slip/trip hazard by creating wet working surfaces. Wearing protective equipment, if required, further increases the risk of physical and/or mechanical injury by decreasing hearing, vision, and agility. Constant vigilance is required to avoid injury produced by drilling tools, support equipment, and motor vehicles. During actual drilling operations TEC personnel will maintain a minimum distance of 10 feet from the auger and the cathead. Specific hazards from drilling activities include, but are not limited to:

- fumes generated by drilling rig and vapors from contaminants;
- overhead utilities during installation and operations;
- rupturing of underground pipelines and utility lines;
- head injury due to free or falling parts from the cat head;
- moving parts such as augers catching clothing or impacting personnel;
- high pressure hydraulic lines and air lines; and
- lack of rig stability due to high winds, unstable or unlevel ground, or equipment malfunction such as failure of stabilizing plates or cracks in outriggers.

Good housekeeping around the site under investigation prevents accidents. Likewise, good maintenance of drilling equipment and proper use of hand tools can minimize the

potential for personal injury and equipment loss. The drilling contractor shall demonstrate to The Environmental Company, Inc. (TEC) personnel that the emergency shut-off switch ("kill switch") is working properly. The kill switch is a steel cable that runs parallel to the base of the drilling platform and, when activated, shut off drilling operations.

All field personnel, including TEC personnel, shall be instructed by the drilling contractor as to its location and proper use. In addition, care will be exercised around wire line hoists and hoisting hardware, catheads, and rope hoists, as well as moving augers and rotary drill bits so that on-site personnel are not pulled into moving machinery or struck by objects.

In particular, soil cuttings exiting the borehole will be removed with a shovel, not kicked away by feet or hands. Soil cuttings exiting the borehole will be promptly containerized using Department of Transportation (DOT)-approved drums.

In boreholes where monitoring wells are not installed, boreholes will be properly abandoned according to procedures described in the Field Sampling Plan. In instances where boreholes must be left open and unattended, barriers such as a traffic cones will be placed over and around an open borehole to prevent personnel and/or equipment from falling in.

Noise

Noise can produce potential hazards because it may interfere with normal communication between on-site personnel. It may also startle or distract. Noise can produce physical damage to the ear that may cause pain and temporary or permanent hearing loss.

There are three general classes of noise which are found around groundwater monitoring site operations. Continuous noise is heard when the drill rig is running, intermittent noise can be heard over continuous noise such as when an air compressor is used, and impact-type noise is produced by hammers and driving drill tools.

Hearing loss can be reduced by using hearing protectors, which act as barriers to reduce sound entering the ear. Protectors include disposable or reusable plugs and ear muffs attached to hard hats. Manufacturers supply Noise Reduction Ratings based on a system which indicates how much noise reduction is attained with each type of protector.

The Occupational Safety and Health Administration (OSHA) has established guidelines to prevent occupational hearing loss. Whenever employee exposure equals or exceeds an average of 85 dB per 8-hour day, TEC will implement a hearing conservation program in accordance with OSHA regulations (29 CFR 1910.95).

CHEMICAL HAZARDS

Chemical hazards may be encountered during advancement of soil borings. These hazards may exist as organic vapors in the borehole annulus and as soil cuttings and drilling fluids exiting the borehole. To minimize contact with potentially contaminated media, the breathing zone of on-site workers in the vicinity of the drill rig will be

monitored with a photoionization detector (PID). Ambient air monitoring will be performed on a hourly basis; more often if drilling conditions warrant. All PID readings will be recorded in a field log book. If PID readings exceed site-specific action levels, personal protective equipment (PPE) may be upgraded to Level C protection.

APPENDIX P

PROCEDURES FOR MONITORING WELL INSTALLATION/DEVELOPMENT

APPENDIX P**PROCEDURES FOR MONITORING WELL
INSTALLATION/DEVELOPMENT**

General hazards associated with monitoring well installation and development include use of heavy equipment and chemical contaminants. For a discussion of noise, electrical, and heavy equipment hazards, refer to Appendix O, Procedures for Soil Borings.

Placement of the casing and screen will be initiated by measurement of organic vapors in the borehole and in the breathing zone. If levels exceed site-specific action levels, the level of protection will be upgraded. Well development will proceed by initially measuring organic vapor levels in the borehole annulus with a portable photoionization detector (PID) after removing the well cap. Measuring ambient air quality in the borehole annulus will allow The Environmental Company, Inc. (TEC) personnel to make a preliminary assessment of personal protective equipment (PPE) requirements. If PID readings exceed site-specific action levels, TEC field personnel will upgrade PPE to Level C protection (e.g., air purifying respirators). Following ambient air monitoring, TEC field personnel will measure the depth to groundwater and total well depth to calculate the volume of water (gallons) present in one well bore. Subsequently, groundwater will be evacuated from each monitoring well until stabilization criteria are met for selected water quality parameters (pH, electrical conductance, groundwater temperature, and turbidity). Air monitoring data, volume of water removed, and stabilization parameters will be recorded on field data sheets.

During monitoring well installation and development, on-site personnel will be exposed to potentially contaminated groundwater. To minimize exposure to contaminants, field personnel will routinely use Modified Level D protective clothing. Of particular importance is the donning of safety glasses and gloves during well development to minimize contact with groundwater that may occur due to splashing and/or accidental spillage.

Well development fluids and soil cuttings generated by monitoring well installation shall be properly containerized using sealed, Department of Transportation (DOT)-approved steel 55-gallon capacity drums. These drums will be stored at each monitoring well location. Each container shall be properly labeled with site identification, sampling point, depth, matrix, constituents of concern, and other pertinent information for handling.

APPENDIX Q

PROCEDURES FOR MONITORING WELL PURGING/SAMPLING

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PROCEDURES FOR MONITORING WELL PURGING/SAMPLING

Groundwater samples will be collected from wells to assess the extent and magnitude of contamination. Sampling activities will include:

- well development;
- sample purging;
- water level measurements;
- water sampling for chemical analysis; and
- surveying.

Experience in the field has shown three constants.

- Organic contaminants tend to accumulate in the well stems.
- In situations where this accumulation has not been noted, disturbance of the water column (e.g., bouncing the bailer) usually degasses some volatile organics.
- These organics tend to escape the well stem as a slug once the cap is removed from the well head, and subsequently decrease in concentration rapidly over time - usually reaching background concentrations within 30 minutes. In highly contaminated areas, this concentration may not decrease.

Based on the above, the following procedures for initial well opening will be followed at all sites.

- The wells will, whenever possible, be approached from an upwind direction.
- Wells, especially deep bedrock wells constructed of solid unvented polyvinyl chloride (PVC) casing with flush-threaded caps, will be opened slowly and carefully to avoid a sudden release of gases due to over-pressure.
- The air in the monitoring wells will be screened for organic vapors with a photoionization detector (PID). All PID readings will be recorded in the field log book. Note that if radioactive contaminants are determined to be present, a radiological screen is also necessary.
- If PID screening results are above background, the monitoring well will be allowed to vent for a period of time (experience has shown that 15-30 minutes is usually sufficient) and screened again. Note that this is a guideline only; the actual time may vary.
- If initial readings are of such a magnitude to indicate a potential health hazard from the venting process, the wells will be immediately recapped and locked.
- If background readings are obtained (or if initial positive concentrations have decreased to background levels), work activities will be initiated in Level D respiratory protection. Note that activities that disturb the water column may liberate organics not previously observed. Based on readings, odors, and their consistency over time, Level C or D protection may have to be utilized again. In general, readings should be taken four or five times every hour at a minimum, as specified by the PHSM.

- If PID readings have not diminished in the allotted time frame, sampling (or other) activities will be conducted using a minimum of Level C protection.
- Standard action levels will be used to determine the adequate level of protection (C or D). In the situation where only one chemical contaminant exists (e.g., trichloroethene), the Threshold Limit Value (TLV), combined with known contaminant history (e.g., maximum concentration) will guide the decision logic for selecting levels of respiratory protection.
- Based on site specific conditions (e.g., if the site is secure) all wells can be opened and screened sequentially prior to sampling. In this way, the maximum amount of time is provided for venting.

At sites where contaminant history (i.e., disposal methods, types and amounts of contaminants, concentrations present in different media) is known and understood through previous sampling, and this data conclusively shows that organics are not a concern, this requirement can be waived by presenting the rationale/justification to the PHSM.

APPENDIX R

PROCEDURES FOR ASBESTOS AND LEAD-BASED PAINT SURVEY

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Asbestos

Prior to collecting asbestos samples, TEC will conduct a building walk-through to diagram homogenous sampling areas, determine material types, assess damage and friability of material, and estimate the quantity of presumed asbestos-containing material. Samples will be collected in plastic storage bags and sealed immediately. General hazards associated with asbestos surveys include electrical hazards, ladders, slips, trips, and falls. More detailed information concerning these hazards is found in Appendix D.

Inhalation of asbestos fibers, skin contact with contaminated materials, and ingestion of airborne asbestos fibers or materials from hand-to-mouth contact due to inadequate personal hygiene are the primary entry routes of potential contaminants during asbestos surveys. In order to minimize these exposure pathways, dust suppression techniques will be employed. Spray bottles containing amended water will be used to thoroughly moisten friable areas. Level C PPE with a respirator with HEPA cartridges will be worn when asbestos dust is likely to be in the air.

Lead-Based Paint

A paint scraper or combination heat gun/paint scraper will be used to collect all layers of paint from the substrate. Where necessary, a heat gun will be used to soften the paint and separate it from the substrate. General hazards associated with lead-based paint surveys include electrical hazards, ladders, slips, trips, and falls. More detailed information concerning these hazards is found in Appendix D.

Inhalation of dust and fumes, and ingestion resulting from contact with lead-contaminated objects are the major routes of exposure to lead. Exposure to lead will be minimized by wearing proper PPE and practicing good personal hygiene. Level C PPE will be required when dust is created as a result of collecting paint samples or when heating the paint. Heating paint releases organic vapors and organic vapor and HEPA cartridges must be used with the respirator.

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APPENDIX S

PROCEDURES FOR METALS AND EXPLOSIVE RESIDUES SURVEY

APPENDIX S
PROCEDURES FOR METALS AND EXPLOSIVE RESIDUES SURVEY

Wipe samples will be collected using moistened gauze to collect samples from an area of 100 cm². The sample will be placed in a sample container and sealed tightly. General hazards associated with metals and explosive residues surveys include electrical hazards, ladders, slips, trips, and falls. More detailed information concerning these hazards is found in Appendix D.

Inhalation of contaminants, skin contact with contaminated materials, and ingestion of airborne substances or materials from hand-to-mouth contact due to inadequate personal hygiene are the primary entry routes of potential contaminants during sampling. Exposure to metals and explosive residues will be minimized by wearing proper PPE and practicing good personal hygiene.

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